Advanced MANAGEMENT

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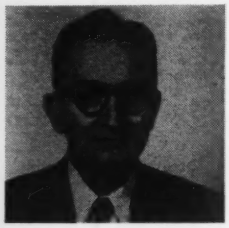

Current Trends In Long Range Planning

THE following trends in long range planning were revealed in a recent survey of one-hundred large companies.

1. Nearly every company that participated recognized the need for more effective long range planning.
2. Many companies had plans for one to three years. A few had five year plans. Very few went beyond that.
3. Key functional executives are spending a larger per cent of their time on over-all company problems and plans.
4. Many companies have organized planning units frequently under a vice president with no other responsibilities except to spearhead the long range development of the company.

What are some of the reasons for these trends? For some companies planning has been defensive. They have slipped competitively by not having critically examined early enough their own products, risks, and opportunities. Other companies have anticipated their problems and opportunities. Through technological advances, developing new products and markets, they have become leaders in their industries. The difference in these two groups stems from managerial attitude. One group has recognized that it is management's job to make things happen, not sit back and wait for things to happen.

This survey also revealed a wide variation in scope and emphasis of company plans. In some companies it is stimulated by sales and limited to sales forecasting. In others, the chief financial officer has assumed this responsibility and only capital expenditures are included. In others, emphasis may be on research or manufacturing.

Looking at a company's future broadly involves company risks, goals, and opportunities. Long range planning goes beyond increasing our share of the existing market. It also embraces new product development, integration, and diversification. Each major function must participate — research, marketing, manufacturing, finance, etc., and the approach must be well balanced and coordinated.

In long range planning we are searching for the answer to two questions; what should our business be, and how do we get there?

To answer these questions, we must consider these major steps:

1. *Establish realistic objectives* as to the character of the company, its products, markets, research emphasis, profitability, financial structure, productivity, organization, and the development of technical and managerial personnel.
2. *Develop policies* to guide management in achieving its objectives and to insure consistency of action.
3. *Execute the program* by breaking it down into logical units, assigning responsibility for specific phases to assure leadership and coordination. Periodically re-examine and up-date the company's business objectives to insure that long range plans are in line with changing conditions.

If a company desires to grow it must first have intellectual respect for the value of an organized approach to planning.

Mr. Ewing W. Reilley, a partner in McKinsey & Company, made this interesting observation in his article, "Planning the Strategy of Your Business," in the December, 1955, issue of this magazine:

> "It seems inevitable that strategic planning, which integrates all aspects of the business and is based on a searching look within, a broad look around and a long look ahead will play an increasingly important role in meeting the challenges and problems of our dynamic economy."

The management of each company should study the conditions which determine the company's future, and develop a philosophy and pattern of growth appropriate for its needs.

John B. Joynt
National President

PROFESSOR ERWIN H. SCHELL introduced the first formalized Executive Development Program in the U. S., at Massachusetts Institute of Technology, where he was Head of the Department of Business and Engineering Administration of the School of Industrial Management from 1931 until recently. He is a prominent author on management topics, a consultant and public speaker. A member of the Society for Advancement of Management and a leader in the international management movement, Dr. Schell was awarded the Wallace Clark Award in 1953 by the Council for International Progress in Management for his work on that project.

DR. F. F. BRADSHAW was Dean of Students at the University of North Carolina for 25 years. He was one of the originators of the Army Specialized Training and Navy V-12 programs, and a Special Consultant to the War Department's Personnel Research Section in 1945. In this same year he organized Richardson, Bellows, Henry and Company, a consulting firm of industrial psychologists, engineers, accountants and lawyers applying scientific research methods to problems in personnel and human relations, and has been president of that organization since its inception.

A Dialogue On Executive Development

A discussion between

Professor Erwin H. Schell

School of Industrial Management
Massachusetts Institute of Technology
Cambridge, Mass.

and

Dr. F. F. Bradshaw

Former Dean of Students, University
of North Carolina and President
of Richardson, Bellows, Henry
& Co., New York City

IN 1931 Professor Erwin Schell introduced at the Massachusetts Institute of Technology the first collegiate Executive Development Program to be given in the United States. This program has won the interest, cooperation and support of industry, and has come to be known as the "Rhodes Scholarship of America." In the following dialogue with Dr. F. F. Bradshaw, Professor Schell answers a variety of questions about the program's origin and early development, and they discuss some of the Problems of Executive Development in the light of the experience which this program has provided.

Initiation of Program

Bradshaw: Just what is this executive training program?

Schell: It is a specially designed twelve-month curriculum of education and training in industrial administration. It is directed squarely toward preparation for top-level line activities in an industrial organization.

Bradshaw: Would you say that it has been aimed to fit men to be presidents or vice-presidents?

Schell: We were more interested in responsibilities than in titles. We hoped to fit men to be useful in policy-making areas and to assume the leadership of important aspects and functions of the business in which they were employed.

Bradshaw: Was the program designed to enable the young executive to qualify for large-company operation or for the head of a small organization?

Schell: As most of our students over the years have come from large organizations, our curriculum has probably been influenced by this fact, although we have not consciously weighted the program in either direction.

Bradshaw: What were your reasons for starting the program?

Schell: I had become aware of the increasing flow of engineers into executive positions some years after their graduation. My own experience in industry had convinced me that these engineers needed help in non-technical areas where such matters as intangibles, competitive unknowns, and moving data must be dealt with.

Bradshaw: I remember hearing a discussion years ago about the fact that 55 per cent of engineers were in management. I was in engineering and I think I remember the public announcement when M. I. T. started this thing that this would give these engineering students a chance to pick up some preparation for management in addition to what they had in engineering.

Schell: We felt that there was a definite need here and we'd had some experience in teaching administration to engineers in our undergraduate school. So this was an effort on our part to make a further educational contribution.

Bradshaw: I wouldn't be surprised if it wasn't one of the first times anybody realized that a man who successfully practices the profession of business management might still profit from some training. We had a habit of training people and then letting them go to work. I think we increasingly realize now that training gets out of date and businessmen may get arteriosclerosis of the mind or something, and that people need to be continually reconditioned.

Schell: We also felt that to prepare a man of scientific or engineering back-

ground for management was a somewhat more fundamental task than to retread, so to speak, or to recondition an individual who perhaps had a liberal arts education. It was a little bit more of a fundamental business problem.

Bradshaw: What did you consider your first major problem?

Schell: My biggest problem was how to impart knowledge about top administration at a time when the state of the educational art in this field was far from completely developed.

I asked myself: "How are you going to teach something about which little has been put down on paper?"

Then I recalled that learning is an instinctive process, reaching back into animal and bird life where there is no written or spoken language; yet oldsters teach and youngsters learn.

So I decided to adopt the educational principle sometimes expressed as "Mark Hopkins at the other end of a log." If a group of relatively young executives of proved abilities could be brought together and exposed frequently to lengthy informal discussions with top executives of undoubted accomplishment, over a period of a year, learning would take place by osmosis or absorption, if in no other way.

The application of this principle proved sound. The weekly administration seminars are still an important—if not the most important—aspects of the program.

Bradshaw: What was your first activity?

Schell: I early discovered that the kind of students required for this program were men with a real sense of responsibility to their families, men who could not reasonably burn the financial candle at both ends, which absence from a job, plus the cost of the year in training, would involve. In other words, some kind of fellowship support would be necessary. So I went to Technology's loyal alumni and obtained funds for six such grants for an experimental year of operation.

Bradshaw: How was the project generally received?

Schell: The reaction was favorable. Some of the initial publicity was a bit lurid. I remember a disconcerting headline across the front page of a Boston newspaper which said:

"Tech to Train Supermen"

Even more disturbing was a catch phrase among M.I.T. students, referring to the proposed group as "Schell's guinea pigs." This fortified our resolution to give the group, in addition to their administrative contacts, an attendant program of graduate subjects of known high intellectual quality and rigor, thus lessening the risk of failure. We knew that in most experiments where guinea pigs are used, science may progress but the guinea pigs always lose.

Age of Fellows

Bradshaw: How did you decide upon the particular age-group that was finally selected?

Schell: The group of six alumni recipients whom I chose for the first year of the program contained one member of the current senior class and one member of each of the first five earlier classes graduating from the Institute. By this means I hoped to decide where the emphasis on age should be placed in further selection. We had a feeling that there was a certain age group with not only scientific or engineering background but also with industrial experience of a sort, usually in operations, who would have reached the stage where they were curious and interested in what takes place at the top. That characteristic doesn't develop until one is reasonably well along toward maturity. My finding was that the greater the length of industrial experience, the greater the ability of the recipient to benefit from the program. So in later selections we drew increasingly upon older age-groups, ultimately arriving at an average age of thirty-four years.

Bradshaw: Why was thirty-four years viewed as a maximum age?

Schell: This age appeared to mark the upper limit of complete flexibility of outlook. After thirty-four, we detected a certain intellectual "hardening of the arteries," in which undue reliance was placed on practical experience. More recently, we have come to feel that individual variances in this age-group make generalization difficult.

Bradshaw: How did you judge these individual differences? That is, in your screening procedure, once you set up your age bracket, who determined, and how, whether an individual was flexible?

Schell: When a man somewhat out of our age bracket was strongly recommended by the president of his company we realized we had a special case so we asked special questions: Why does this man appear to have unusual flexibility? In other words, the burden of proof was placed on the person who recommended him.

Length of Program

Bradshaw: How long does the program run?

Schell: The program runs for twelve months. It always has started in June, with an orientation period, and has continued into the following June.

Bradshaw: What caused you to adopt a full-year program?

Schell: The age-group which we decided upon required a fundamental type of education, in addition to the contracts with successful executives mentioned earlier, which could be provided only by two ensuing terms of intensive administrative study, following the summer orientation.

Bradshaw: Did the length of your program introduce any problems?

Schell: Yes. A year-long program brought a problem in that families of the recipients necessarily took up residence in or near Cambridge. Also, the cooperating company had to deal with the extended absence of a good man from its organization.

But experience has taught us that bringing the families of recipients together in a concerted effort offered unexpected educational advantages; and the recipient's extended absence from his plant usually required that his old job be filled, thus enabling him to undertake new responsibilities on returning to his company.

Bradshaw: What companies have been most affected by the length of the program?

Schell: The small companies found it difficult to spare a man for a twelve-month; whereas the large companies were somewhat more comfortable in terms of available personnel.

Bradshaw: What was the attitude of cooperating companies toward the one-year program?

Schell: The test of attitude here was the "repeat order;" and I have never heard of a company which, after having an executive in the program, did not wish to repeat the experience with others of its staff.

Bradshaw: What factors affected the number in the group?

Schell: The optimum size of the group for informal discussions with executives was the controlling factor.

Bradshaw: What changes have taken place in group size?

Schell: For some years the group remained small. Then, with the support of the Alfred P. Sloan Foundation, the number was increased from six to approximately ten. Since 1950 we have been enabled to increase the size of the groups further to an average of thirty per year. These groups have been divided into two sections.

Bradshaw: There must have been a strong group integrity because of the small size of the group and the unified curriculum.

Schell: Yes. The one really extraordinary factor was the ability of the Fellows quickly to amalgamate and form a cooperative relationship. It may have been because they were in the atmosphere of learning which impelled them to stand together and to look at problems jointly. As far as I know we never have had any cliques or divisional groupings develop.

Bradshaw: What has been your experience with sections?

Schell: The division of Fellows into two groups of fifteen each has worked out well. It has, of course, meant doubling the number of executive seminars, as fifteen to eighteen Fellows appear to be about the limit for good group discussion. In rare instances involving lecture presentations, the groups have met as one; and in making plant visitations the groups have been changed in composition.

AT ONE time we feared that two groups would cause invidious comparisons of speakers; but nothing of the sort has developed. And the upper limit of group size is yet to be determined.

Bradshaw: What faculty resources did you draw upon for this program?

Schell: From the beginning, students have been exposed to the senior teachers on our faculty. This was not difficult to arrange, as contacts with such a highly selected and widely experienced student group have been viewed as an opportunity no less than a challenge.

Bradshaw: Has this program had any noticeable effect upon the teaching group? In other words, did the faculty tend to learn from these younger executives?

Schell: I think so. The formal teaching activities as well as the evening conferences engendered much discussion, both within and outside the classroom. Faculty members have had unusual opportunities to become more intimately acquainted with the realities of background or environment in which administrative decisions must actually be made. This give-and-take has done much to increase the spirit of humility in both student and teacher.

Recruitment of Candidates

Bradshaw: Did you accept applicants who applied individually?

Schell: No. The suggestion that an applicant seek a Fellowship had to originate with the company president or major executive.

Bradshaw: Have company executives shown a willingness to assist in these recruitment activities?

Schell: They have been of great assistance. They have used a variety of screening techniques; and, as a result, we have benefited by the extremely careful review of available executive talent on the part of top management. Thus the number of applicants who precisely met our specifications has increased, while the number of applicants eventually to be disappointed has decreased.

Bradshaw: Have any companies thought this a good way to get rid of a problem — a young man who is a little too big for his position? They might figure that he would go somewhere else after being at M.I.T. for a year.

Schell: I think that such "problem-children" were automatically eliminated in the first weeding. If a man was to be considered at all he was required to fill out a questionnaire and write a letter stating why he wanted to take this course. That letter carried considerable weight. Then we requested supporting letters from a variety of people; and this procedure again eliminated many applicants because the requirements were rather severe.

Bradshaw: How did you select recipients from candidates applying?

Schell: The applications were assembled and referred to an *ad hoc* committee composed of a faculty member, a member of the administration, an industrialist, and the director of the program. This committee examined the applications in relation to specifications, and reduced them to perhaps twice the number desired. The director of the program then travelled about the United States, interviewing the selected applicants, their superiors and subordinates, and visiting the

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April 27, 1957.....Board of Directors
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members of their families. Upon completion of this tour, the committee was again convened and the final recipients selected with the aid of the additional data thus obtained.

Bradshaw: What were the main subdivisions of your initial qualifications to be met by applicants?

Schell: I have previously discussed the age requirement. We also expected a Bachelor's degree (a four-year course in an accredited college or university) with a large proportion of candidates specializing in science or engineering. We wanted at least five or ten years of business experience (recent groups have averaged over ten years, including military service). We wanted assurance that the candidate had the recommendation and enthusiastic support of several levels of his company's management, and that he would be granted a year's leave of absence and suitable financial aid from his company.

Bradshaw: How did you obtain all of the information you required?

Schell: We obtained assurance of the applicant's future prospects in the company via a letter from the president or operating head.

We obtained evidence of effective performance in the company from the field interviews.

We judged of personal qualities from interviews at the company and the applicant's home, coupled with letters of reference from a former teacher, a business associate, a personal friend, and an official in the company.

We measured his recognition of executive responsibilities by means of a written statement in which the applicant presented his reason for applying for the program.

We placed much weight on his academic record in judging his intellectual vigor.

Bradshaw: You mentioned the home. Did you investigate the wives during the screening process?

Schell: Yes, we felt that they should be talked with preferably in their homes. The field investigator frequently arranged to have dinner with the applicant and his family. But we leaned most heavily upon the recommendation of the president of the company. It was only through the president or the administrative officer that application for the program could be made.

Bradshaw: That means really that he had the eyes of the boss on him before he even started the program?

Schell: He was carefully screened long before we ever saw him.

Bradshaw: What is you ratio of applicants now to acceptances?

Schell: As a result of the severe nature of our specifications the list narrowed to two to three times the number we admitted. That's where we like to keep it.

Bradshaw: You don't want too many rejections?

Schell: That is correct. We have in the past requested companies to present a candidate every other year rather than every year, simply because there was need to give others an opportunity.

Bradshaw: How was the program originally arranged?

Schell: There were three major divisions —the initial summer term given over to preliminary surveys, with the subsequent fall and spring terms devoted to analysis in depth.

Bradshaw: Have there been any changes in the work assigned in each term?

Schell: In the summer term, under the headings of Management, Economics and Labor, there has been developed three so-called "package subjects," each especially designed to contain a round of allied material and each employing the services of more than one faculty member.

Bradshaw: Are all subjects elective?

Schell: The summer series and the weekly seminars are obligatory. Also those Fellows who wish to work toward a Master's degree are required to complete a thesis. In addition, there are optional series available in the fall and spring terms in such areas as Management Operations, Economics and Finance, Social Science, and Human Relations. There are also many elective offerings, of which Administrative Policy, Industrial Relations, and Public Policy are examples.

In addition, the Fellows usually met once a week with an executive of demonstrated ability. During an informal meeting he covered a considerable amount of his experience and discussed some of his current problems.

Bradshaw: Did the students meet with the same executive straight through, or with a different one every week?

Schell: The seminar group met with a different speaker every week.

Bradshaw: That gave you about thirty different executives?

Schell: Yes. The program was run in two sections, so we had a double group of executives. But we did not ask an executive to meet with both groups.

Bradshaw: At this meeting, did the executive give a talk first, followed by discussion?

Schell: Yes, although the Fellows were expected to ask questions as the presentation proceeded.

Bradshaw: Just what has been covered in the scientific or technical areas?

Schell: In earlier days, when background in science and engineering was a prerequisite to Fellowships, the program did not include formalized courses in these areas. More recently, a series of Technical Seminars has been introduced in which faculty members in science and engineering discuss with the Fellows new developments in their respective fields.

Bradshaw: You hope that the training program does improve their judgment as well as their scientific breadth?

Schell: We have come to the realization that there are many factors, some of an intangible nature, which are important in the solution of managerial problems. We hoped that the Fellows would become accustomed to search for, to discover and to apply these factors.

Bradshaw: That's one kind of education that we usually don't know how to do much about; how to educate a person for increased effectiveness in handling the non-measurable items.

Schell: That is true. And it is partly for that reason that we hit upon the idea of having the weekly meetings with executives because we believed that the Fellows would learn indirectly, through seeing, listening and absorbing them. They would have the realistic experience of close juxtaposition with administrators and would get the feeling of the managerial situation and the approach to it.

Bradshaw: When I hear that, I am re-

minded of the remark that is sometimes made about Oxford, that the process of education at Oxford is mainly that of getting a student well-smoked by a tutor.

Schell: I used an analogy of Mark Hopkins on the other end of the log.

Bradshaw: I'm particularly interested in this question of instructional method. Have these Fellows some project that runs through the year? Do they write a term paper or are they responsible for a personal, professional investigation that is their own individual work?

Schell: Most of the Fellows work for a Master's degree. In that event, one requirement is a thesis, a rather extensive, original investigation.

Bradshaw: We hear much in the field of management development about the "case system," popularized by the Harvard Law School and the Harvard Graduate School of Business Administration. Have you consciously made extensive use of the case system in your program?

Schell: I think it's fair to say that we have. Our feeling about the "case system" has been that it was one of several educational devices, such as the seminar, the discussion group, the evening dinner meeting, the lecture, and the plant visitation. All of these were devices which we believed useful, and we hoped that each teacher would apply a balanced ration. Some have used more cases than others.

Bradshaw: We have heard lately about a program which relies heavily on what is called "principles of professional management." Have you an equivalent content in that area in this course? There's been some controversy between the case system with no principles versus principles with no cases or maybe with some cases.

Schell: Here I shall make a personal statement, although I think it has been accepted by many of the staff. We have favored a middle road in what we called the "burden-of-proof process." This meant that, as of a given stage of any art—let us say building design—there was what might be called an orthodox design. If we studied a plant which did not have this orthodox design, then we would ask this plant to bear the burden of proof. For example, if the orthodox design incorporated a two-story building with a ramp at the back, then why was it not used in this plant? There may have been many good reasons why it was not used; but the burden of proof was on those who diverged as it were, from what appeared to be the current state of the art. For each situation there may be a "one best way." But we believe the "one best way" can only be "today's best way" because the world is dynamic, and ever-changing.

Bradshaw: I'm right fresh from this kind of discussion. I'd be interested to learn where you get into this in your curriculum. For example, in one company the delegation of responsibility and authority have to be tailored specifically to individuals. Another company is run by fourteen members acting with unanimity after a lot of muddle and huddle. Have you any body of accepted principles of organization and management that you regard as fundamental as you instruct the student?

Schell: We have been just as concerned about obsolescence as any progressive industrialist would be. We have been concerned about any crystalline policy or procedure which will not adjust readily to the pressures of change. We have not leaned as heavily as others on the thesis that all we wanted to do was to develop the mind. I think it's fair to say that we believed that mood had to do with good decisions, no less than thought. The mood of a buyer properly differs from the mood of a seller. On the other hand, we have no courses in moods.

Bradshaw: Yes, I guess you are allowing the climate and the interchange between these people to develop. Was it your assumption that the Fellows in the course would add a considerable amount to each other's education?

Schell: Yes. In this age group this lateral give-and-take was found to be valuable. That is one of the factors which changes with the age of the individuals. The older the executives in such groups, the more they appear to benefit.

Bradshaw: I gather from what you say that you are a little more consciously struggling for flexibility since these people are mature and might crystallize too fast. You feel flexibility is more important for them than orientation in any basic theory.

Schell: That is right. We have been concerned with the accelerative changes which are taking place, and felt that it would be an educational crime to give men any sense of static structure or "eternal verities."

Bradshaw: You spoke earlier about the judgment of intangibles, things that are not measurable. Did you consciously make an effort in this year's experience (I use the word "experience" deliberately, getting away from the word "curriculum") to contribute anything to the spiritual, philosophical or ethical maturity of these Fellows as a basis for making judgments about management policy?

Schell: I don't know that I can answer that fully because I was not familiar with everything that our professors taught. They were given wide latitude, of course. It does so happen that I myself have given to the group a course in the philosophy of management in which we discuss certain of the deeper fundamentals. In our educational work we have placed reliance upon the individual to concern himself about spiritual matters.

WE AS an institution are and have been for many years an international educational organization, which means that on our campus there are many religions. That, coupled with the traditional point of view in these areas, has led us, I suppose, to give individualistic place and weight to religious interests.

Bradshaw: I'm curious about two other areas of possible need on the part of these Fellows. One you might say involves the personal skill area. There has been a good deal of emphasis on management's ability to read fast enough to keep track of the material that comes across the desk. Have you any special provision for assistance to individuals who feel the need to improve their skills in reading, writing, and speaking?

Schell: Yes. We have provided for the Fellows a course in rapid reading for the last several summers. It is an elective program, and those who take it seem to make large gains.

Bradshaw: Now, another question in this field of personal skills or personal adjustment. You are probably familiar with the efforts being made in various areas to do psychological counselling or mental hygiene for management. Some companies have a company psychiatrist. Do you make any special provision or effort in this program to help these people in their adjustment and understanding of themselves as mental hygiene prob-

lems—such as preventive mental hygiene for future administrators?

Schell: There is a graduate subject which many of the Fellows elect, called "Inter-Personal Relations." This raises a host of issues within the industry or between the industry and the outside from the approach of the social scientist. As to the Fellows themselves, one of the elements which the company president has in mind when he recommends a man to us is emotional stability, so that the men are carefully screened in this respect by their employer. We have a highly selective group. A curious fact is that we must be sure that a man has a bona fide opportunity ahead of him; otherwise we do not take him. The cost of this program is so high that we cannot afford to take any risks here. This is a rather paradoxical situation. If a man has assurance of opportunity, we consider him; if he hasn't, we would hesitate.

Bradshaw: I think that's justified, as you say from the point of view of the cost of the program. That probably takes care of this in a considerable measure, although I believe it is characteristic of mature people that sometimes when they leave one company for another, what was apparently good adjustment may fail, or when they leave a special field like management of a function and become general managers, a good adjustment may sometimes suffer. Do you ever have that happen in the program?

Schell: I think there may have been two or three cases where the young men had previously been under a very heavy load, and the transition weighed too heavily on their remaining resources.

Bradshaw: It's somewhat like the experiences dentists have. You have a tooth abscessed, but your body is adjusted to the abscess and when the dentist pulls the tooth out you get an infection in the blood stream. So that sometimes these people who are on the surface very well adjusted under a load, begin to get problems when the load is taken off. The flywheel races. I suppose the fact that you have screened so well is the reason why you haven't had more of such cases.

Schell: Characteristically, we haven't had them. I don't think it's to be inferred that the course was an extraordinarily difficult one. It was not. Indeed, one of the opportunities we hoped to provide was the opportunity for a degree of meditation, and even the lightening of activities in certain areas.

Bradshaw: You didn't want to keep the Fellows harnessed to school chores of such dimension that they had no time to think or explore questions?

Schell: That's right. This leads me to another point, which I don't think has been made. In the early days of this program, the Fellows were generally confused after the first few weeks of meeting presidents, because they expected to find some uniformly common characteristics. Instead they discovered that these men were essentially different in type, and reaction. The Fellows used to come to us and say, "These administrators approach their problems very differently and yet they are all successful." We would answer, "Yes, that's true." Then they would say, "Well, I'm not happy about this. I'm trying to develop a formula or a theory of leadership, and I'm getting some very confusing data."

THEN, after a few months, they would say, "You know I've come to the conclusion that administrative method varies markedly in terms of the individual administrator. What I have to do is decide what is best for me."

From this time on, each man related each concept to its special application to him, to his resources, to his temperament, to his God-given talents, whatever they were. Then he began to get more confidence in his administrative ability.

Bradshaw: That's extremely interesting. And that's your flexibility there too. They couldn't crystallize since you broke any prior crystallization up and you didn't give them another, and they had to work it out for themselves.

Schell: Yes. And this understanding explained why we hadn't more faith in any fixed or static theory of administration, because of the fundamental differences in people. Of course, we have been quick to recognize that there are in all of us certain fundamental drives that base all human effort.

Bradshaw: Well, there is something which always sticks in my mind, and I'd like to give it to you as a stimulus and see if you have any other reaction. Plato, I think it was, said that he was opposed to books because books said the same thing to everybody and everybody didn't need the same thing said to them. And then there was a nice little Confucian story about the wheelright telling the duke that he was wasting his time reading the words of the sadist, and the duke asked him to make good or that otherwise he would cut off his head. And he said, "Well, I'm a wheelright. If I wheel my tools too vigorously the parts of the wheel fit together too loosely; if I don't wheel them vigorously enough, they won't fit together at all. This much I can put into words, but how vigorous too vigorously is, I can't put into words." It involves timing, somehow. I think principles have their place. I think experience and knowledge of other similar qualities have their place also somewhere along with principles. But after all when you are introduced into a situation, what you get by your radar is different from what I get. You are sensitive to the forces and the likeness of this situation as you see it for the next step. What Mr. Eisenhower will do tomorrow will be different from what Roosevelt or Woodrow Wilson would have done tomorrow. It seems to me that really that difference is almost more important than the difference in knowledge of principles and cases. But I'm not sure we know how to prepare for it in any way or how to improve it. In other words, it seems to be the major teaching job, but we have almost no theory on the method of accomplishing it.

Schell: It's been said that the history of a nation is more the reflection of the personality of the fiscal officer of that nation, than anything else. He runs the stop and go light. And his personality, his way, go far toward determining the fiscal decisions. We felt that about the age of thirty-four or in that area, the problem was certainly not one of forcing pre-conditioned learning upon an individual. It was more one of offering as one would do on a luncheon table, a variety of menus for the Fellows to select from. Our task was one of exposing them to these varieties of diets upon which they would selectively nourish themselves and, we believe, strike a proper balance just as three-year old children will eat a balanced ration if you lay out the food and give them a few days of free choice. Our only restriction was that our Fellows could not specialize. They were not allowed to take enough subjects in any one area to specialize

in any sense. But it was a little more complex than that. It was an exposure to industrialists who, perhaps, found it very difficult to tell *why* they do as they do, but were very happy to tell *what* they do.

Bradshaw: Well, the only thing that we've found in our studies that excited me somewhat is the apparent statistical indication that something which corresponds to what Overstreet called "emotional maturity" went along with this thing. For instance, boys who have a job away from home earlier, have their own allowance earlier, make their decisions about their dates and their activities and their schooling earlier, tend to make better supervisors than those who don't do those things early. That indicates something along the line of forced ability.

Schell: Forced ability, you mean, as a result of the pressure of circumstances upon the individual?

Bradshaw: Yes. For example, it's like a man I knew who was a very successful businessman. He said he was not very well educated. He left high school as a matter of fact, but he once made ten million dollars in seven years. He said when he came to developing an executive, he usually discovered that he by-passed the fellows that he got from colleges and picked some applicant who had left school in the eighth or ninth grade and had sold newspapers on the street because his father had died. And he figured the one reason for it was that the other fellows had too much information and didn't have any judgment. But this fellow always assimilated every experience he had because he had to make use of it right away. He had developed a sense of direction and a capacity to say "yes" and "no" in situations that were complex, while the other applicants didn't get any data to help him solve the situation. I don't know whether that's valid observation or not, but I was always interested in it.

Schell: We feel that tomorrow's future, the future which is close upon us, is now introducing a new language — the language of managerial mathematics. Can managers of the future be expected, for example, to understand the mathematical details of data processing? The distinguished pianist does not know how to tune a piano. He knows how to operate the black and white keys but someone else understands what is in the case.

Bradshaw: That's a good figure of speech.

Industrial Visitations

Bradshaw: You speak of field trips. Were they an early part of the program?

Schell: At the outset the Fellows were urged to visit nearby plants—particularly those differing from their own—during the interims between terms. The first formal step was the addition of a series of industrial visitations in the Midwest, between summer and fall programs.

Bradshaw: How has this part of the schedule been altered?

Schell: The current program incorporates three week-long visitations to Washington, New York City and the Midwest. These are arranged in paired sequence and the Fellowship group is again divided into two sections.

Local field trips are arranged to fit into the course schedules of the Fellows.

Bradshaw: What has seemed to be the special value of these trips?

Schell: There is a realism in meeting top executives in their native habitat that can be gained in no other way. More than this, widely differing forms of manufacturing may thus be emphasized. The major advantage is the opportunity for these visitations to be simultaneously experienced by all members of each group, thus affording bases for subsequent group discussion and establishment of a reasoned point of view.

Financial Arrangements

Bradshaw: How are finances arranged?

Schell: When the candidate is accepted, he is designated a Sloan Fellow and receives an award (normally $1,000) to defray a portion of the extra personal and family costs resulting from the year here.

The employer normally pays the Program Fee, continues the Fellow's usual compensation and provides for such necessary extra living and moving costs as are caused by his participation in the program but are not covered by the Fellowship award.

Bradshaw: Is it felt desirable that the recipient bear personally a portion of the costs?

We have felt that when the program is completed the recipient should be slightly less well off financially than he would be, had he continued his normal work.

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Results of the Program

Bradshaw: How many men have been through this program since its inception?

Schell: Approximately 225, not counting the present class. Since the sponsoring of the program by the Alfred P. Sloan Foundation, some 150 men have been granted Fellowships.

Bradshaw: Have many of your graduates now reached administrative responsibility? Have you any substantial number who don't get there, even with this preparation?

Schell: I think it's fair to say "no" to your last question. Some of the earlier Fellows found after the program that they would like to return to their former assignments—to scientific or engineering activity. On the whole, however, those who have taken the program were eager to proceed in administration, a field which fascinated them.

Bradshaw: Have you had "drop-outs" in the program, people who didn't care to stay or couldn't stay?

Schell: Very exceptionally. I think during the whole program, we have had not more than three.

Bradshaw: That is a remarkable record.

Schell: One or two were matters of health.

Bradshaw: Is it your recollection that the positions to which they have gone as contrasted to the positions they come from have pretty well covered the waterfront?

Schell: What seemed to happen was that the student returned to his company and for a time reestablished himself as a part of the organization. He may have been temporarily viewed as a mysterious sort of person because he had been away, and perhaps a year was necessary for the organization to relax with regard to his potentiality. Then usually within three years someone tossed him the ball for a forward pass, something to be done, characteristically something which involved a variety of functions. I might say that a study I made some years ago indicated that a number of the men who went back to their company found their way into areas of new products development, and the relationship of these activities to marketing, finance, production and other operating functions. The majority, however, returned to line activities of an executive nature.

Bradshaw: Were you able to evaluate the program in any way in the early days?

Schell: During the early experimental period it was necessary to evaluate the program every year on a sort of feed-back basis. Reactions, opinions and suggestions were obtained from faculty members involved, from members of the Technology administration, from the cooperating companies, from the donors and from the students themselves. On the basis of these data, the program was revised annually.

Bradshaw: Are there any general criteria that have been found helpful?

Schell: We have felt that the extent to which the cooperating companies "want more of the same" is one practical criterion of the value of the program. Similarly, the extent to which companies have been willing to go to considerable pains to screen their organizations for subsequent candidates indicated the sincerity of their support and belief in the program.

Bradshaw: What have been your problems of evaluation?

Schell: I suppose the chief difficulty has been the absence of a control group. We could not pick a similar group who would not receive fellowships and compare them with the recipients over a period of time.

It has also been difficult to measure the success of the program in terms of the later accomplishments of the Fellows, as they were able men with an assured opportunity before them, to begin with.

Some years ago we reported to our donor that the total annual increase in remuneration due to promotions or other factors of all of the alumni of the program during the preceding year was greater than the corresponding annual grant of the Foundation. This statement had no statistical significance other than indicating that the constructive influence and opportunities of those who had taken the program were showing a healthy increase.

Bradshaw: I suppose this might be an unfair question. But as you see the future, aside from any quantity of expansion of this program which you might regard as desirable, what would you envision as qualitative changes that would seem to you to be wise and profitable?

Schell: I have a feeling that the administrator will face increasing rather than decreasing responsibilities. And let us say these will be in the nature of social trusteeships. The reason is that our economy is becoming predominately industrio-social. Willy nilly, these broader, wider, deeper problems are going to be laid at management's door for solution. We hear a great deal of talk and feel a great deal of concern about the inability of top management to free itself to think in terms not only of increase in variation and pattern but of increasing rate of change of these patterns. So I have a feeling that it will be in these magnified areas that the administrator will feel the impact of issues which cannot be gainsaid and which will demand his attention.

Bradshaw: That is, they will find themselves responsible not only for profitable operation with things as they are but will also help to decide how things will be?

Management of change, rather than merely adjustment to change.

Schell: Yes. It's not only profit, it's not only survival, it's really the assuring of a better future.

Position of the Program in the Field

Bradshaw: Has this program differed from others of more recent origin?

Schell: Such differences have proved to be logical. Collegiate programs in executive development may be expected to differ in terms of the average age of the executives to be served. Obviously, a program for an executive of twenty-five or thirty would properly differ from a program designed for a man of fifty or fifty-five.

Bradshaw: Just what are these differences?

Schell: As the age of the student increases (from seventeen to sixty), the duration of the executive development program tends to decrease; the educational value of discussions within the group increases; the usefulness of expositional teaching methods decreases; the importance of discussion of basically controversial issues increases; student interest in broader and inter-related aspects of administration with other allied fields increases. Finally, in measuring self-progress, younger students tend to watch the mileage; older students, the speedometer.

Bradshaw: How does your program fit into this spectrum?

Rather appropriately, we think. The length of our program (one year) seems to be proper for the younger executive who is seeking a fundamental training in administration.

With ten years of industrial experience, the students gain much from informal group discussions and yet are eager for expositional presentations such as are normally a part of post-industrial study in a relatively new field. Finally, in our age-group, students reflect a healthy interest in areas of the humanities and social sciences and yet have not lost the willingness to undertake the rigorous intellectual disciplines inherent in the study of basic industrial and managerial fundamentals.

Bradshaw: Does this position in the spectrum hold particular advantages for you?

Schell: We believe so. The appeal of the Master's degree is a healthy motivation for the Fellows; the extended use of a powerful teaching staff in presenting administrative subjects is a large resource. Finally, the opportunity to do a thorough job of orienting and educating the young man of brilliant promise for utimate top-management responsibilities is a challenging one to faculty no less than to Fellows.

Bradshaw: Do you feel that a company might properly present candidates to a variety of training courses offered by different educational institutions?

Schell: I certainly do. Colleges and universities are now offering a range of programs for executive training. The menu laid before industry is constantly expanding and will continue to do so as new needs and opportunities develop. The day is already close at hand when educational institutions may each present several programs depending upon age-groupings or other differentiations. There is "an infinity of perfections" here.

Bradshaw: What general trend has the greatest influence upon the future of collegiate executive training programs?

Schell: I believe the current and continuous accelerations of industrial and social change will influence top-executive development more than any other single factor. Industry is marching to an ever-faster quick-step. New developments of a basic nature are hurrying upon us. To my mind the administrator is facing a new and immediate challenge. He must acclimate himself to basic change ever more rapidly, which means that he must learn faster than ever before. The higher we go in the corporate executive structure, the better "learners" we must be. ■

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EVERETT H. BELLOWS has been Assistant to the Executive Vice President of Olin Mathieson Chemical Corporation since May 1954. Previous positions he has held were Assistant to the E.C.A. Administrator in Washington, Director of Productivity and Technical Assistance in Paris, and a member of the staff of Booz, Allen and Hamilton. Mr. Bellows received his A. B. and an M. A. from George Washington University.

Administrative Arrangements And Policy Objectives

By E. H. Bellows

Assistant to Executive Vice President
Olin Mathieson Chemical Corporation

THIS is the story of a motherless child. Nothing is so orphaned, nothing so unwanted as the mundane task of providing those physical and procedural facilities which belong under the heading of "Administrative Arrangements." Policy formulation, on the other hand, is always so glamorous, so obviously significant. On grounds of prestige and ambition, not to mention the genuine desire to serve or to challenge one's capacity for thought and action, the right to set policy objectives is sought out and held closely by all those who can grasp it.

And yet, what in fact happens? A Scottish poet taught us long ago that

"The best-laid schemes o' mice and men
Gang aft a-gley;
An' lea'e us nought but grief and pain,
For promis'd joy."

One can only view with pain those schemes which were never well-laid to begin with; indeed one may shudder in the grey dawn when the details of execution are ignored.

But there is also a positive side to administrative arrangements which grows out of the mere fact of their existence, however unwittingly devised. Administrative arrangements will determine the scope, the direction of policy; they will limit or enhance the effectiveness of policy in proportion to the degree to which they are in harmony with, or at cross-purposes to, policy objectives. And finally, their very accidental character can be persuasive and ultimately binding.

The ease with which decisions can be made—or avoided; the relative emphasis on one activity or on one plant at the expense of others; the effectiveness of staff offices; the accumulation of impedimenta and bureaucratic distractions; all these potentially plus-or-minus qualities are conditioned by the character and purposefulness of administrative arrangements.

Consider the matter of space and physical location. In the multi-plant operation manufacturing the same product-line, production scheduling is ideally centralized and located separately from any one of the manufacturing sites. This is especially true if the product is sold nationally through one sales force. Similarly research, and top operating management as well, should be separately located from manufacturing, so that in effect all staff services and directional functions housed together, but away from production, will be free to treat each plant location equitably while servicing or controlling the whole. Moreover, this arrangement keeps production from calling upon research at the first sign of technical problems and increases the probability that genuine research activity will not be neglected in order to solve production problems simply because the latter are urgent and close at hand. One instance of this purposeful administrative planning is to be found in a corporation with plants in North Carolina and in Indiana. These two plants have their production scheduled by the Production Manager's staff in New York. Similarly shipping instructions emanate from that same office in close liaison with sales and credit.

Administrative arrangements such as those just described may well serve a large corporate activity with annual sales in the millions of dollars. But I know the contrast of an Austrian manufacturer of ready-to-wear clothes whose solution to administrative arrangements was to have none at all, so far as he himself was concerned. When I visited him at his plant in Vienna in January 1952, I found he had no office, no desk, no telephone (but access to many). Don't imagine that this was a one-man tailor shop! Far from it. Our Austrian manufacturer employed several hundred people and had several factory outlet stores. And he also had a policy—personally to know and to inspire every member of his staff. When he discovered that an office, a desk, and a telephone kept him immobilized, kept him out of touch with his staff, and interfered with his creative effort, he abolished the bureaucratic trappings. Admin-

istrative arrangements served his policy or ceased to exist in their usually recognized forms.

Sometimes, however, there are major policy objectives which can be adroitly served through purely administrative techniques. Consider for example, the problem of creating one unified management team from disparate groups after a corporate merger has taken place. A recent deliberate and successful effort along this line was the creation of research and management committees which cut across historic jurisdictions within a corporation. At first limited to a recommendatory function, later raised to the level and authority of operational decisions, these committees now represent corporate opinion and take corporate action. Regional and inherited viewpoints no longer obtain. Here then is a specific policy goal, quite aside from the substantive value of a committee's deliberations, achieved by proper administrative arrangements. The fact that some of the participants were located in different buildings and even in different cities could have delayed achieving such unity indefinitely.

The Extent and Character of Delegated Authority

Quite possibly the most pervasive of all administrative relationships is the extent and character of delegated authority. This involves, of course, more than form, but even form is important. When a home office is issuing instructions for the guidance of division managers, plant managers, sales representatives or others who must interpret written instructions in the field, it should go without saying that the message must be meaningful to the recipient. Or, to state the problem a little differently, the writer must visualize his audience. This perhaps is a conceptual as well as a procedural problem, but on both counts failure is more common than success with the consequence that well-intentioned policy goes amiss. The cause again is insufficient attention to administrative detail. As a general rule no one should write instructions for others who has not himself experienced the problem. Unfortunately, whatever institutional situations exist — and they do exist in big government and big business — someone usually writes instructions for others to carry out. In this situation the full implications can be missed so that a seemingly routine instruction may carry hidden within it important policy determinations.

A remarkable example of this occurred recently when a corporate comptroller's office issued a revised instruction for the recording and submission of expense accounts. Among other changes, the revision called for monthly, in lieu of weekly, automobile expense accounts. The immediate effect was more than to double the amount of cash advanced to salesmen in the field—a decision which if reviewed separately on its merits would have been turned down by management.

More important than form and procedure, however, is the level of authority and responsibility actually delegated. This apparently administrative consideration becomes in fact a major policy question for it frequently determines the level and quality of the people top management can get and hold. As a consequence, one normally finds the strongest staff in areas where delegation is most effective and goes furthest. Moreover, the phenomenon is cumulative; or perhaps one could say that it is amenable to example, for in situations where delegated authority is in turn appropriately passed down the line of management, the whole level of achievement is raised. Thus, for example, where it is corporate policy—as it ought to be—that foremen, the first line of supervision, are part of management, it is then essential that foremen have real authority to a proper and reasonable degree, such as the authority to settle a grievance when it first arises. Similarly, the foreman must be in the communication stream; he must know company policies, the terms of the union contract, the company's plans for the immediate future. Administrative arrangements can be so geared as to make these desirable conditions near routine or they can be so neglected that any sudden effort will be viewed with suspicion—such as a dinner for foremen two days before a union election.

As you ascend the chain of command there is clearly no question but that the contribution to policy and the imaginative execution of policy are limited directly as authority to act is limited. Consequently delegation is an administrative device for releasing creative effort and the withholding of authority an administrative check for purposes of control. A decision to do one or the other ought to be a conscious decision in harmony with policy objectives.

The Organization Pattern

The organization pattern is itself a major administrative arrangement with tremendous policy implications. Let us suppose that in a multi-product company it has been decided to place the full responsibility for operating profit and loss on division managers, each responsible for a given product or product-line. Then organizational structure and theory must support this policy decision. Specifically, the central staff experts must be "on tap, not on top". If this is not the case, the division manager can properly say—and believe me, he will say—that he cannot be held responsible if the earnings figure is not what top management expected.

If on the other hand, the company is organized by function, or if extensive control is held closely and centrally by a small top management group (or even by one person), a wholly different policy is implied. In the first case it has to be assumed that there are unique values in functional specialization that will in fact earn a profit. The second instance suggests growing pains. Whatever the fact, it should be remembered that the administrative decision as to organizational structure was also a policy decision and the two should not be separately arrived at.

Despite what has just been said in passing reference to central staff experts, I am forced to add that the administrative situation of certain key staff will immediately affect their usefulness to line operators. Here again the organization pattern will limit or advance policy objectives.

Finally we come to our old friend "span-of-control". Textbooks to the contrary, it is abundantly clear that the number of persons one man can successfully direct varies greatly with the man in question. Nonetheless there are real limits even when empirically determined, and this too is an administrative detail with reprecussions on policy. If the top man must personally direct too many people, some areas will suffer.

To summarize, policy is important, exciting, and frequently not what it seems. Policy is an idea; rightly conceived, it is a desired course of action or attitude to achieve some beneficient purpose. There are good and bad policies and there are policies that succeed and policies that fail. And, of course, there are voids in which no conscious policy is formulated, although a policy of sorts, shaped by events may arise. But whatever its origin, and despite its purpose, any policy is a fragile creation. It survives, it flourishes, it sickens, it collapses utterly—depending upon the character of the administrative arrangements which support it. ■

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A Revolution In Thought

by Fritz Jules Roethlisberger

The following remarks were made by Mr. Roethlisberger during his acceptance of the Taylor Key Award from the Society for Advancement of Management on October 25, 1956.

IT SEEMS to me that the philosophy of management is undergoing a revolution in thought comparable to the Copernican revolution of the 16th century. At that time the earth was regarded as fixed, with the sun revolving about it. Copernicus suggested that a more fruitful conception might be to regard the sun as fixed with the earth revolving around it. This new conceptual outlook, although it explained more facts more systematically, was viewed with alarm and consternation. It seemed to run counter to the facts of common sense observation. But more than this, it seemed to de-throne man from his central position in the universe.

If I may be permitted to draw an analogy it seems to me that our business world is going through a very similar upheaval. The traditional and common sense outlook says that management occupies the central and fixed position around which the organization revolves and from this fixed position all things are to be evaluated and measured.

This way of thinking fits well with the facts of our daily observations about the movements of the executive just as the Ptolemaic or pre-Copernican way of thinking fitted well with the facts of daily observation about the movement of the sun. Just as we see the sun rise and set so do we see the executive issue orders, make decisions, settle questions of policy, fix goals and set standards by which the activities of others are measured and evaluated.

But the pre-Copernican outlook failed to take into account a wider range of observations about the movements of the planets. In the same manner the traditional outlook of management as occupying the central position around which the organization revolves fails to take into account a wider range of observations about organizations and the behavior of people in them. What it has difficulty in accounting for are many observations that would seem to suggest that the more the executive practices literally the common sense point of view, and the more he measures all things in terms of *his* standards, the more he loses the cooperation and personal development of the people he administers. This is a serious state of affairs for the executive. He cannot do his job alone; he needs the help and cooperation of others. What water is to a fish, so an organization of people is to an executive.

This state of affairs also poses a serious dilemma for the student of administration. For in trying to make sense of the common sense outlook he finds himself in the awkward position of trying to conceptualize what the behavior of an executive should be were he not involved in and a member of an organization.

As a consequence some students of administration feel the need to change their outlook. The traditional conception of management as measuring all things from one absolute fixed point, they find no longer useful. A more fruitful way of thinking about organizations and the relations of executives to them is needed. What is required are measurements of an organization from different points of view as well as from a point of view which takes these different points of view into account. Therefore, they conceptualize a business organization as a social system analogous to the solar system, i.e., as a system of mutually interdependent parts in which management plays an important but not the only stellar role.

This new conception, quite naturally, is viewed with alarm in certain quarters. It sounds strange to our common sense ears. It seems to deny the centrality of management's position around which all things revolve. For those who have these feelings, may I offer one observation: The history of civilization has shown that when man has divested himself of egocentricity and anthropomorphism, he has become not only more effective but more moral, mature and civilized as well. In the same manner I believe that the more the executive can accept gracefully the fact that the organization does not revolve solely around him, the better executive he will become. When he begins to measure things from many different points of view and not only from his own, what at first may feel like the beginning of his end will become the start of a new adventure in growth into professional competence.

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DR. LUCIEN BROUHA received his M.D. and Sc. D. from the University of Liege in Belgium, where he was also Professor of Hygiene and Applied Physiology from 1932-1940. He has served as physiologist for the Office of Scientific Research and Development; consultant in Chemical Warfare Service, U. S. Army; Director of Medical Research, Aluminum Corporation of Canada, and Professor of Applied Physiology, Quebec. He went to du Pont in 1950 and since 1954 has been Chief of that organization's Physiology Section, Haskell Laboratory for Toxicology and Industrial Medicine.

Physiological Study Of Motions

By Lucien Lauru

Paris, France

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Newark, Delaware

IN ATTEMPTING to give the employees the best possible working conditions, engineers try to achieve motion simplification by applying principles such as minimum motions, symmetrical motions, simultaneous motions, etc., and the results are evaluated by time studies.

From Taylor to Bedeaux and MTM, valuable attempts have been made to improve work. Working standards and rhythms have been established and studies of the psychological aspects of the problem are progressing. But the fundamental question has not been adequately tackled because no measuring method has taken into account the basic and irreducible core of the physiological possibilities of the human machine. No one can judge the real value of a given way of doing a job without knowing the stresses that are imposed upon the worker. Without this knowledge, industrial engineers work in the area of empiricism and must depend upon their intuition and common sense. The study of the human factor in industry must be based upon the laws that regulate its production of mechanical energy. It is necessary to take into consideration the magnitude of the effort corresponding to the accomplishment of motions in a given time, the effect of that effort on fatigue and the adaptation of the speed of motions to the physiological possibilities of man. The scientific knowledge of the physiological and psychological factors regulating the functions of the human body is the only solid ground for management and the industrial engineer.

In order to reduce fatigue, stress and the resulting strain must be diminished and it is, therefore, essential to be able to evaluate them.

If it is reasonable to try to produce at the lowest cost, this goal must never be reached by reducing the quality of the product nor by impairing the health and the safety of the workers. The worker must have machines built for him according to his aptitudes so that he can use them with almost complete safety and with as little muscular effort as possible. He can then acquire a very high degree of precision in performing the various motions involved in his job. The tools must be studied so as to produce a minimum stress, and physiological conditions of work must be found that will require a minimum amount of effort thereby reducing the causes of fatigue. Postponing the time when fatigue appears will result in protecting the worker, since fatigue indicates an exhaustion of his resources, and in improving the efficiency of work within the limits of the possibilities of the human body.

From the physiological point of view, muscular fatigue, which is only one element of the psycho-physiological complex of over-all fatigue, depends on various factors such as energy expenditure, changes in the muscle chemistry, changes in blood circulation, sweat loss, exhaustion of carbohydrates and changes in neuromuscular excitability. It is not necessary that all these mechanisms act together and one alone can produce a diminution of activity characteristic of fatigue.

The psychological aspect of fatigue is no less important. It seems to derive mostly from anxieties of the worker who has to perform a task involving muscular activity, whether great or small, which he does not fully control and which may influence his safety, the quality of his production, the total amount of work accomplished, etc. This psychological fatigue reflects the mental influence of the conditions under which the work is performed. In addition, the behavior of the worker can be influenced by the general atmosphere of the plant, by his health and by external factors, such as family problems, which may displace the threshold of fatigue.

In fatigue, only some of the factors can be measured and it is impossible to hope for a total measure because of the complexity of the psycho-physiological phenomenon. Shall we then stop trying to reduce fatigue? Certainly not, but we must realize that fatigue can

be controlled only if we are able to reduce one or more of the conditions that produce it. For example, fatigue can be reduced and delayed if physical efforts are minimized, since these efforts are one of the main causes of fatigue.

It is, therefore, important to measure the efforts performed during work so that they can be ultimately reduced with the same final useful result being still achieved. Fatigue prevention must be oriented along that line.

Our method of physiological study of work presents a basis for diminishing fatigue resulting from industrial motions by attempting a physiological simplification of these motions so that the worker can perform them as economically and as perfectly as possible. As a consequence, the effects of the physiological and psychoneurological factors present in the job are reduced.[1]

When we study work, such as lifting a weight to a given height, it is easy to measure it in kilogram-meters. But the strain and fatigue produced do not correspond exactly with the magnitude of the external work and depend only on the effort required of the body to perform the work. Effort can be defined by the forces that produce the motion, and also by the energy cost of these forces. What are the physiological techniques which give the possibility of estimating accurately effort under these two aspects? They are the mechanical, that is, the measure of the magnitude of the forces involved, and the metabolic, that is, the measure of the energy expenditure required.

Mechanical Analyses

A subject standing motionless is submitted at his center of gravity to a force which is his weight and which cannot be consciously controlled. Whenever the subject makes a motion, the displacement of the bodily masses creates other forces. The sum of the forces involved in the physiological effort is transmitted through the center of gravity to the postural point of application, in this case the ground. These forces can be measured by utilizing sensing elements incorporating piezo-electric quartz crystals. Strain gauges, condensers and other methods have not been found satisfactory. The quartz crystals, as shown by Langevin, present a dielectric polarization when they are compressed. The advantage of this technique is that the piezo-electric crystals have an oscillation frequency much higher than needed for our measurements. Furthermore, the compression of the quartz is very small and with an adequate surface and thickness of the quartz the compression is only a few microns. Forces from a fraction of an ounce to several tons can be measured. The apparatus consists of a detecting platform, an electrometer relay and a recorder.

Platform

The platform is a mechanical device which permits the location in space of the various quartz crystals so that they can simultaneously pick up phenomena arising vertically, frontally and transversely. These are amplified and recorded. The platform is triangular, built of very rigid metal and easily transportable. It is made of two plates and a base. Between the two plates three quartz crystals are located one at each angle of the triangle, and these measure the vertical forces. In order to measure the frontal and transverse forces the two plates are in close contact with several crystals mounted on the base. The subject when standing on the platform is completely free to move without any restraint. (See Figure 1.)

In order to avoid errors in measuring efforts it is necessary to lose none of the electrical energy produced by the quartz. An electrometer without inertia is utilized. It is a thermionic electrometer tube in which the resistance from grid to cathode is more than 10^{15} ohms; this tube gives current variations which are recorded by an oscillograph.

The amplifier is a two stage model and it is possible to record simultaneously up to nine channels on photographic paper.

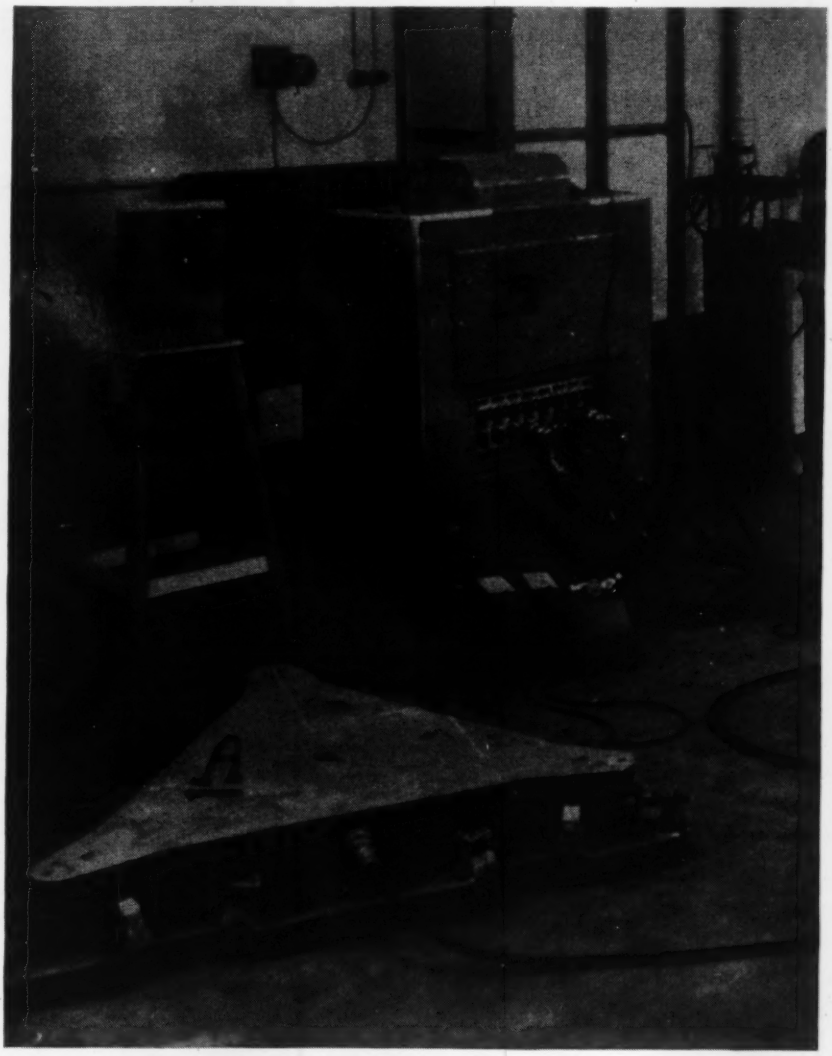

Figure 1—The triangular force platform (A) and the multiple-channel recorder (B).

[1] *These experimental studies were conducted at the "Centre d'Etudes Scientifiques de l'Homme", Paris, under the direction of Professor C. Soula, M.D. and with the cooperation of the National Safety Institute.*

The nine channels can be used for recording: (a) muscular forces in three directions; (b) true forces developed in one, two or three directions, (c) heart rate per beat; (d) muscular action potentials; (e) blood oxygen content; and (f) time.

Procedure

With the subject on the platform the whole system is balanced to zero. As soon as he moves, the piezo-electric quartz crystals in the three dimensions are submitted to pressure variations which are proportional to the forces applied to the body by the neuro-muscular system. Figure 2 shows the record of the three components during bending of the knees and straightening to an upright position. When the vertical component, which is most important in this motion, is analyzed, it may be seen that bending involves *active forces* from certain muscles displacing the body downwards and *braking forces* from the antagonist muscles which control and finally stop the motion. Straightening up is also composed of an active motion followed by a braking effort. When the subject moves the arm laterally, the lateral component shows a sinusoid curve indicating a motor effort at the beginning of the motion and a braking effort towards the end of the motion. The same result is obtained when, in a reverse motion, the hand is brought back in front of the chest; frontal and vertical components are much less influenced. When the subject extends his arm forward, a diphasic curve is obtained mostly in the frontal component, the vertical and lateral being here less influenced. Each simple voluntary motion involves a motor effort and a braking effort.

Voluntary motion is initiated by the mental representation of a useful result to be achieved. This representation plays the role of a psychic stimulus which initiates a series of motor reflexes following each other according to a pattern adapted to the psychic stimulus. The voluntary motion initiated by a mental representation finishes when this representation is completed. Everything happens as if the stopping reaction were contained in the motor stimulation.

This motor control implies a braking mechanism which is shown experimentally by the second portion of the curve in which the pressures transmitted to the platform are inversed. This indicates an active participation of the antagonist muscles during the last phase of the voluntary motion.

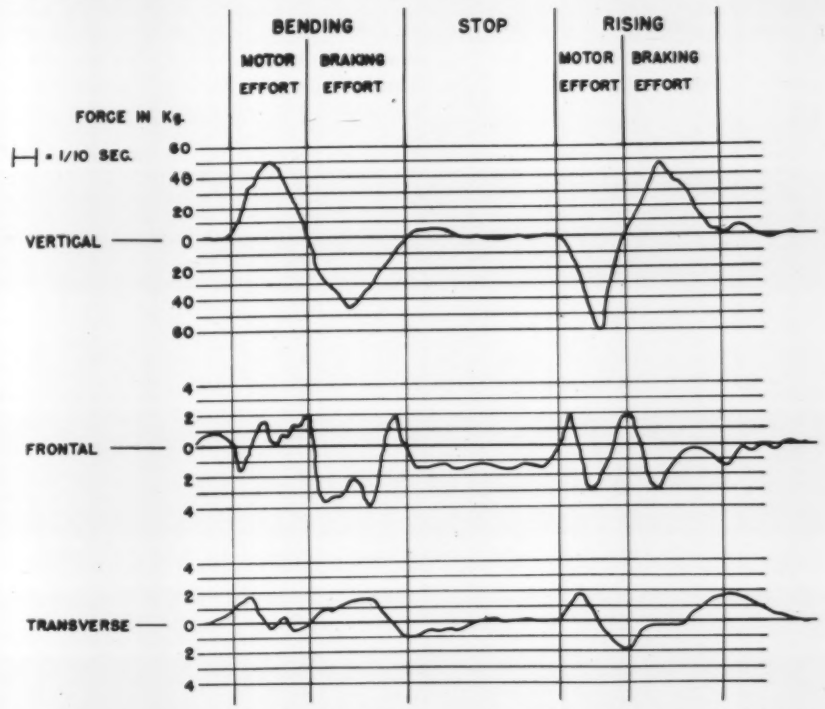

Figure 2—Record in the three dimensions of the efforts involved in bending the knees and straightening up.

In the simple reflex, the inhibition of the antagonist muscles is synchronous to the contraction of the active muscles. This inhibition is followed by the contraction of the antagonist muscles which takes place towards the end of the contraction of the active muscles and which, under normal conditions, limit their action.

Our analysis finds in the voluntary motion all the characteristics of the simple reflex as described by Sherrington. The most complex motion is only produced by reflex actions mobilizing muscles and bones. Our total study of the voluntary motion offers the possibility of a complete understanding of the role of the antagonist muscles in the motor function because it brings the precision of graphic recording and measurement to the knowledge of the mechanical forces which limit the amount and the duration of the motion.

The apparatus records, with a changed sign and applied at the center of gravity of the subject, the sum of the dynamic forces involved in a motion; and this is done continuously as a function of the time of the motion.

Because the coefficient of proportionality is negative, a positive ordinate indicates a negative force, i.e. downwards; a negative ordinate indicates an upward force. (See Figure 2) In fact, we obtain a record that traces quantitatively the whole history of the forces developed by the neuromuscular system during the execution of any motion. Such record shows clearly all the elements of the motion studied.

The application of this method demonstrates that among all the motions producing the same useful result there are some that require less expenditure of internal forces. For any external work there is a most efficient motion which is the least costly. Job improvement can only be achieved by adopting this economic motion. Optimum functional conditions for the execution of voluntary movements or job motions make the only sound and correct basis for the problem of industrial labor. These conditions define, in each particular case, the most favorable solution for the worker.

Energetic Analysis—Economic Rhythm

Having determined the conditions of execution of a motion requiring a minimum of effort for a given useful result, we study its energetic cost. The energy expenditure coincides with the cost of the effort. It can be measured by indirect calorimetry based upon the average calorific value of the oxygen consumed. This measurement systematically applied to various motions shows that for each motion there is an optimum speed of execution for which the energy expenditure is minimum. The motion studied is repetitively performed by a

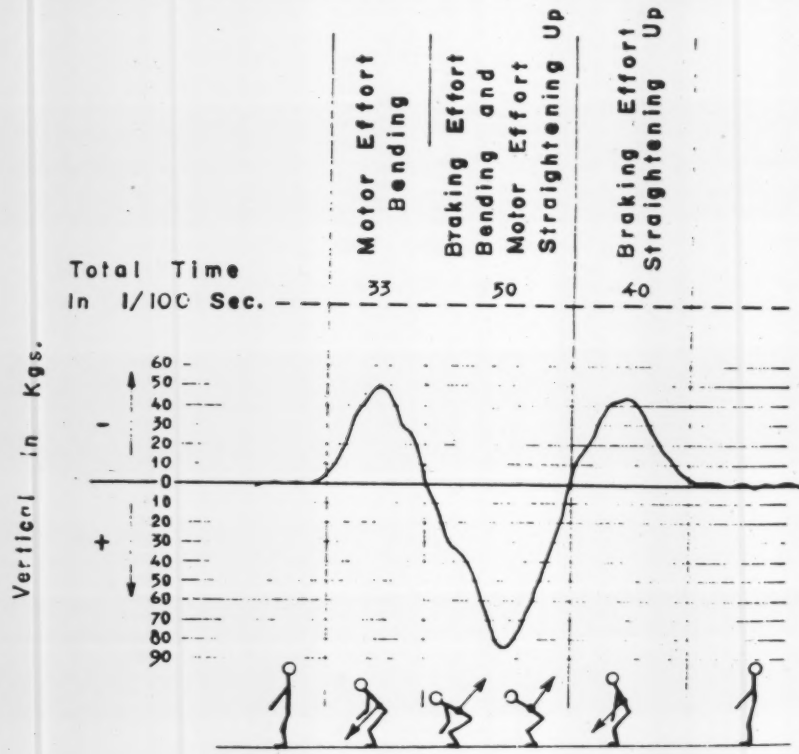

Figure 3—Vertical forces involved in bending and straightening up the knees in a continuous motion.

subject breathing in a closed circuit apparatus which measures oxygen consumption. By repeating this measurement at variable frequencies per minute, one can find the frequency corresponding to the optimum speed.

Such a study was made of a typist's desk and the motion of picking up sheets of paper preparatory to typing was evaluated. The measurements were recorded first under the usual standard conditions and then under conditions that had been improved as a result of the study of the efforts required by this motion. The efforts were reduced from 4 to 1 and the oxygen consumption from 1.60 to 0.42 liter. This is a functional optimum determined by intrinsic factors depending on the constitution of the human body. It is the time during which a well-defined effort is accomplished with the most favorable conditions for the subject.

Study of Some Specific Motions

Figure 2 shows a record of bending the knees, stopping and then straightening up. Figure 3 shows the pattern of the vertical component when the same motion is performed without stop between flexing and extending the legs. In this case the braking effort during flexing is added to the motor effort of extending so that the total effort is much greater than those observed in Figure 2. A very short stop, impossible to evaluate visually or with a stop watch, is enough to change the pattern of the efforts. A time study expert would give the same time for the two motions. This is physiologically a mistake, since the effort involved is much greater for the nonstop motion than for the motion with stop.

We have also made a series of recordings of a subject lifting with the right arm various weights from the ground to a height of 80 cm and working with complete freedom at his spontaneous speed in each case.

Figure 4 shows the influence of lifting various weights on the motor forces and on the braking forces. This graph indicates clearly that there is no proportionality between the external work produced and the internal effort resulting from the integration of the mechanical forces produced by the muscle fibers. It is worth noticing that the braking effort does not increase in relation to the weight in the same proportion as the motor effort. The weight helps the braking effort which becomes relatively less important when the weight increases, so that an apparent external work may correspond to real muscular efforts totally different according to the way of doing the work, according to the weight involved and according to the speed of motion. The consequence is that the external work produced is not a basis for the study of fatigue. The so-called "fatigue allowances" based exclusively on the apparent external efforts are arbitrary.

All these experiments show clearly that this method of measurement represents, as faithfully as possible, all the details of muscular effort using a quantitative criterion which is independent of all psychological influence. Furthermore, the method shows and evaluates the braking forces which represent a loss in the total performance, but nevertheless contribute as well as the motor forces to the intrinsic deterioration of the human machine.

Industrial Applications

When one studies the complicated motions performed in a job, it is found that their amplitude is a function of the spatial location of levers, pedals, axis of work, etc., of the machine or the tools utilized. A complex curve is obtained which is always the same under identical conditions of performance and which expresses the sum of the mechanical effects of each simple movement involved in the job. The amplitude of the recorded forces is proportional to the corresponding efforts, whether they are positive or negative, producing or braking the action.

The recorded curve is a faithful and constant representation of the dynamic forces and of the braking forces involved in the job performed under precise conditions and achieving a specific result. For the same final useful result, when it is possible to reduce the amplitude of the recorded forces by modifying the geometrical conditions of performing the motions, that means that more economical conditions of utilizing a machine or a tool have been found. The final useful result is then obtained with less energy expenditure and consequently less fatigue.

As an example of the method, let us examine first a well-known and remarkable example of motion simplification described by Gilbreth in the work of the bricklayer. Figure 5 shows a record of the efforts involved in laying one brick when the bricklayer works according to the usual conditions found in construction and shown by the diagrams at the upper part of the figure.

Figure 6 shows the record of the efforts involved in laying one brick according to Gilbreth's method. The two arms work simultaneously. The right

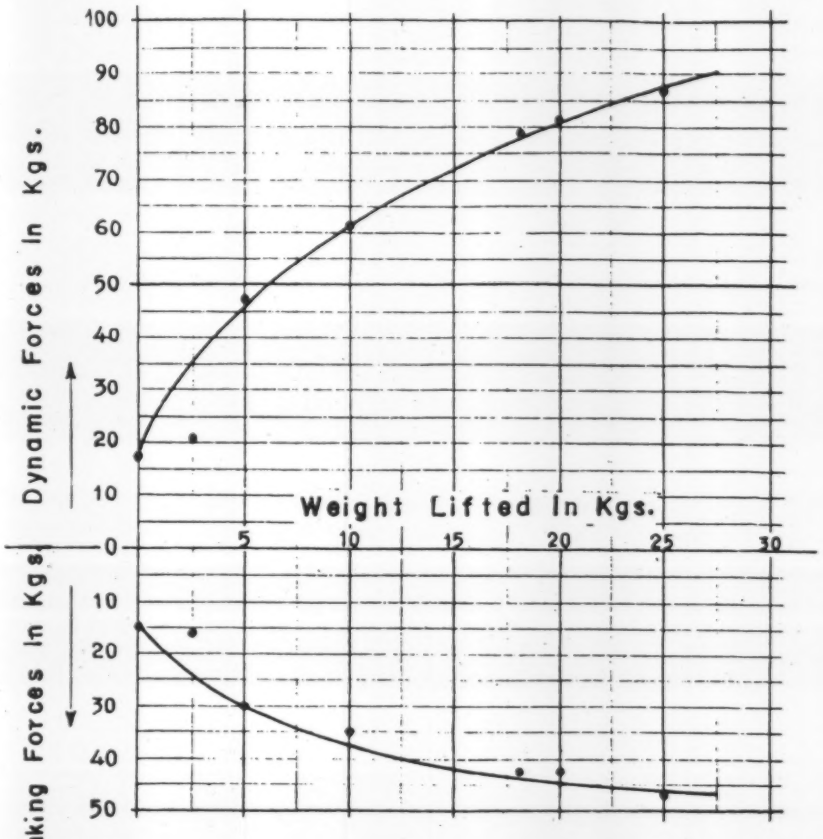

Figure 4—Influence of lifting various weights on the motor and braking forces.

arm takes the mortar while the left hand picks a brick. It is apparent on the vertical component that the dynamic efforts to take mortar and brick are reduced. But the transverse and frontal components show that, in performing the motions in such manner, postural efforts are required which trace a curve situated always on the same side of the zero line and shown as a shaded area.

In a dynamic work certain muscles produce a motor effort which is recorded as a curve of small duration located on one side of the zero line. Then these muscles rest and recover while other muscles, the antagonists, produce the braking effort which is recorded in a curve on the other side of the zero line.

On the contrary, during postural work the muscles contract continuously and they have no benefit of rest periods as in the dynamic efforts. In this case energy expenditure is determined more by the duration than by the intensity of the effort.

In making his man work with the two hands, each one having to perform a cycle of motions and efforts quite different from the other, Gilbreth is asking for a coordination effort which frequently results in a new postural stress.

Our new method of motion study gives us the possibility of recording the curve produced by the postural effort. In the record of the cycle of motions recommended by Gilbreth one can see the various muscular stresses imposed which are indicated by the shaded areas. By keeping the same intrinsic conditions of work, but by not working the two arms simultaneously, the efforts are considerably reduced as shown in Figure 7. Consequently, this solution gives a greater production for less effort.

One must compare the above observations with the deceptive results sometimes obtained in factories where working simultaneously with both hands is required. In the long run, the workers complain of excessive fatigue and, in spite of the incentive of bonuses, prefer the old operating method. This example emphasizes the danger of work simplification achieved by following principles which apparently are logical. On the contrary, by organizing a job under the scientific control provided by the measurement of muscular forces, one can avoid these physiological errors for which the worker will have to pay sooner or later.

I. Examples for Work on Machines

The physiological study of work is the surest means to find out how a machine can be utilized with a minimum amount of fatigue, and with maximum safety for the worker, since accident prevention depends primarily on the exact adaptation of motions to the capabilities of the man.

A. Grinding Station

We have chosen this example because it is frequently found in industry and the conclusions can be easily transposed

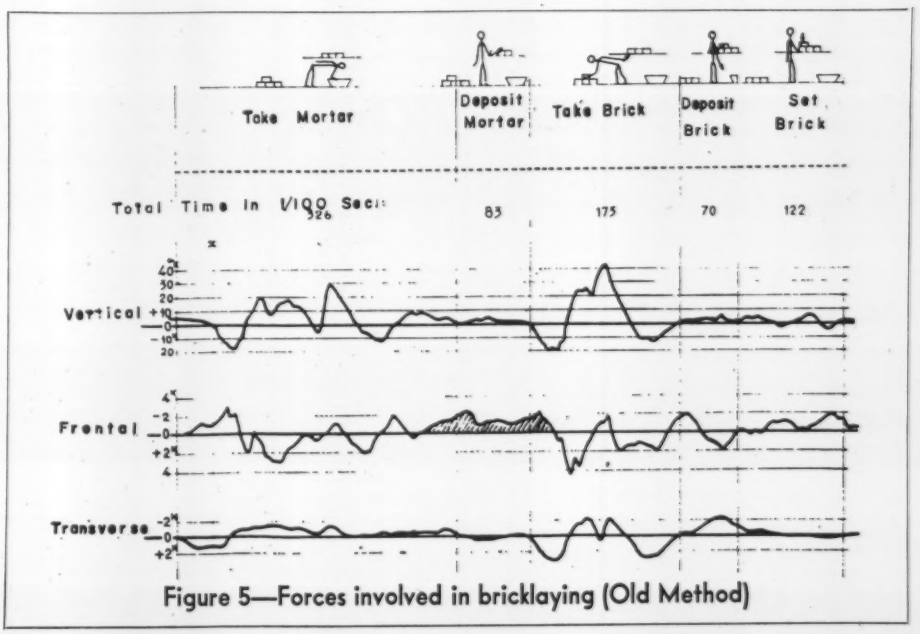

Figure 5—Forces involved in bricklaying (Old Method)

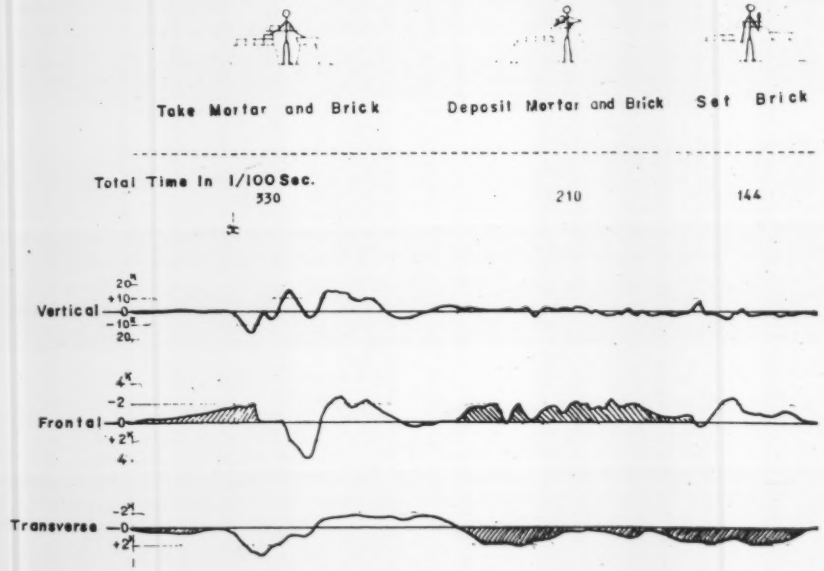

Figure 6—Forces involved in bricklaying Gilbreth's Method—two arms working simultaneously.

to some other operations.

The problem can be summarized as follows: Why is a worker required to bend to pick parts off the ground where he will have to return them after he is through working with them, so that the next worker will also have to bend to pick them up again, and so on and on? One must admit that this situation is so commonly found in industry that it appears natural and rational!

Let us analyze a work cycle performed by a qualified worker at his grinding station.

A cycle of work comprises:

Motion I
Take part —rotate body toward pile of parts
—bend and take one part
—straighten up

Motion II
Deposit part on machine —rotate toward grinding machine
—position part on support

Motion III
Grinding —maintain contact between part and grinding wheel according to work to be done
—rotate toward pile of finished parts

Motion IV
Deposit part —deposit finished part.

It is evident that in Motion I (take part) the greatest forces required from the worker are spent when he picks up the part. The bending motion on the vertical component in this industrial job gives a curve similar to that shown on Figure 2.

In Motion III (grinding) it is almost impossible to reduce the efforts of the worker while he is grinding because of the diversity of the parts and of the specific requirements of the grinding itself. Nevertheless, in each instance study should be made to find the most economical way of operating.

In Motion IV (deposit part) the parts being ground are usually crude and do not require too much care in handling. Nevertheless, it is necessary to take into account the fact that in this kind of operation 15 to 20 per cent of the parts will be relatively fragile and will have to be handled with care.

With the aim of defining the geometrical characteristics of the work station which will enable the worker to perform his task with a minimum of effort, we have studied successively the following motions: take part, place part on machine, hold part during grinding and deposit part. The measure of the forces necessary to produce each of these motions resulted in organizing a new work station for which we have studied the coordination of these various motions during a complete work cycle. This series of measurements gave us the possibility to determine the characteristics of this new station which involves a conveyor and requires from the worker a minimum amount of physiological expenditure. The motions are organized as follows:

Motion I
Take part —the right hand having deposited a finished part on conveyor in A takes a new part on the conveyor in B

Motion II
Put part on machine —bring the part to the machine

Motion III
Grinding —displace left hand toward the part to hold it strongly with both hands
—apply part against grinding wheel according to work to be done

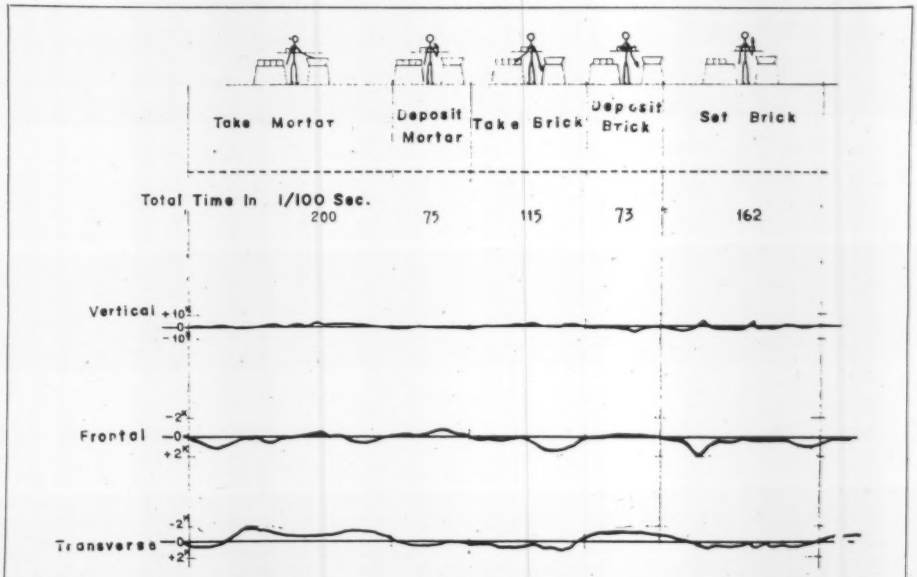

Figure 7—Forces involved in bricklaying Gilbreth's Method, one arm working after the other.

Motion IV

Deposit part—deposit part with right hand on conveyor in A.

Performing this cycle of work is simple and easy. When the platform records obtained before and after the physiological study were compared, it was found that the forces exerted by the worker were reduced with the new method and, consequently, fatigue was also reduced.

It should be noticed that in this solution of the problem, using a conveyor also eliminates the necessity of bending to deposit or to pick the parts from the ground for the workers that precede and follow the grinding operation.

It is, therefore, possible for a given job to determine the sequence of motions which require the minimum effort from the worker. The comparison of the necessary efforts before and after improvement shows that replacing the old method by the new one is definitely advantageous.

B. *Spinning Machine*

These machines are built in several rows, all mechanically identical. Taking care of the bobbins represents quite a strenuous exertion which has to be maintained during eight hours. No wonder that numerous female workers who have to fulfill a production quota determined by time study alone, are obliged to stop because of continuous and severe muscular pains or sickness. The best conditions to utilize these machines were determined after a study of the necessary efforts; these were reduced from 5 to 1, and the operating time was also reduced. This study has improved the work on the machines already in use, but it also has defined the various characteristics that a new and more rational machine should have.

C. *Cutting and Stamping Press*

We have analyzed the successive motions involved in a work cycle of cutting and stamping in order to determine the best conditions for performing the following movements:

(a) Feeding: take part and place it on press;

(b) Removing: take part on machine and remove it;

(c) Motion of activating machine by lever in order to define the best position of lever;

(d) Motion of activating machine by pedal in order to determine the best position of pedal;

(e) Motion of displacing the band when it is utilized either back and forward in a frontal axis, or laterally or according to an angle.

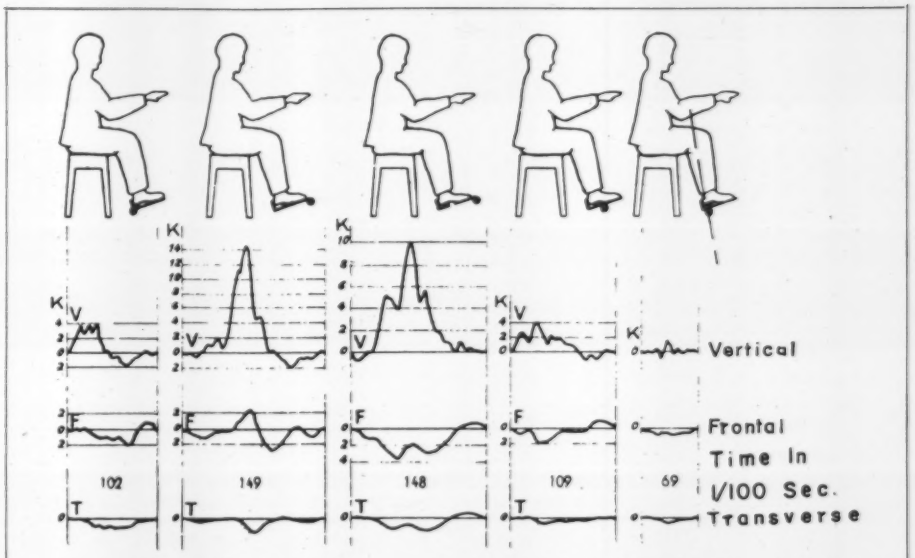

Figure 8—Forces involved in activating cutting press by five different kinds of pedals.

These motions have been studied with the operator standing and sitting so that the best characteristics for the two positions have been determined.

Figure 8 shows the results of the study of activating the machine by pedal in the sitting position. We have tested several types of pedals and determined where the pedal is better located in relation to the worker and to the machine. Going down from the top of the chart the curves show successively: vertical efforts, frontal efforts, time and lateral efforts. These are the muscular forces involved in addition to the useful force applied on the pedal to move it.

Pedal No. 1 has its pivot behind the heel. In order to activate it one must move the leg and the foot. Muscular contractions are needed to maintain the position of the foot between two motions.

Pedal No. 2 has its pivot in front of the toes. The thigh, the leg and the foot are involved in moving it. Muscular contractions are also needed between two motions.

Pedal No. 3 has its pivot in front of the toes but the heel is fixed. Similar efforts as those involved in Pedal No. 2 are needed.

Pedal No. 4 has its pivot under the foot arch. Contractions are needed to hold the foot in position. For Pedal No. 5 the pivot is in the axis of the tibia. Because of this position the leg can relax and no effort is needed to hold the foot in position.

When these records are compared, it is easy to see that Pedal No. 5 is by far the best model. When the efforts developed during a complete cycle of motions performed under the standard conditions of industrial work are compared to the efforts developed during the same cycle of motions after the job has been modified according to the results of our physiological studies, it is found that they

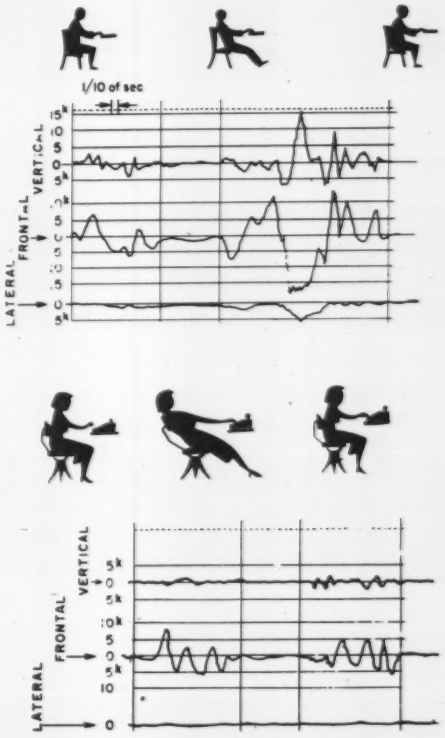

Figure 9 — Forces involved in moving from typing position to relaxing position and back. Upper curves for standard seat. Lower curves for sliding seat.

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have been reduced from 6 to 1 and that the time to perform the various operations has also been reduced.

D. Welding Machine—Study of the Pedals

We have shown in the previous example that the kind of pedal which requires the minimum muscular efforts is one that has its pivot in the tibial axis. This kind of pedal offers also a correct support to the leg between motions so that there is no muscular effort to maintain the leg in position and ready to act again.

In general, the pedal of a welding machine requires the following cycle of motions: the worker is standing and brings the right leg and foot forward; with the heel on the ground, he places the foot on the pedal; he presses the pedal down; he moves the leg and the foot backward to return to his initial position.

The records showed that the forces needed to perform the cycle of motions described above were comparatively great and the duration of the performance was long. On the contrary, the postural efforts between two strokes of the pedal were normal to maintain the standing position. In a second series of experiments the muscular forces required when the worker keeps his right foot on the pedal between two strokes were measured. In this case he does not have to move his right leg to bring his foot to the pedal. The forces needed for the displacement of the right leg and foot were eliminated and the efforts and time required for activating the pedal were slightly reduced. On the other hand resulting efforts necessary to maintain the body balance between two strokes were considerably increased.

Reducing the time required by the operation should not impose upon the worker throughout the shift an increase in the postural efforts. As a consequence we have studied in a third series of experiments what would be the position of the right leg which would give the worker the possibility of performing his job with a minimum of postural efforts in the standing position.

A new kind of pedal fulfilling the postural requirements determined by our study was adopted. This pedal has a fixed support for the heel about one inch high and slightly curved to facilitate the foot's motion. Body balance with this pedal requires only very small efforts. The analysis of the records showed an important diminution of the vertical forces needed to activate this new pedal while the frontal and the lateral forces were the same for a faster performance.

Similar studies have been made of the efforts required for using various tools. In several instances the tools could be redesigned and their handling modified so that the job could be performed with much less effort and greater efficiency.

II. Examples for Clerical Work

Similar physiological studies have been made for various kinds of office work. The records have shown what is the most economical sequence of motions for several jobs. These findings have resulted in redesigning some office furniture and equipment which can be used more efficiently and with less fatigue than the standard models.

A. Sliding Seat for Typing Desk

Certain commercial standard seats seem adequate to insure a satisfactory working position. They are usually built with a seat vertically adjustable and a rigid back adjustable in height and depth, or with a back mounted on spring which maintains the back of the typist in a normal position.

Careful observation of the employees shows the following facts: the typist adjusts her seat so that she will have a correct position while working. As soon as she wants to rest she is obliged to take a relaxing position on a seat which is adjusted for working only. She slides forwards and keeps leaning on the back of the seat. When she gets ready to start typing again, she straightens up her trunk but does not use the back of the seat. The aim of maintaining the employee in an adequate position is not fulfilled and may even become one of the factors which produce the ailments that the seat is supposed to avoid, such as abnormal muscular contractions, scoliosis, displaced spinal discs, etc. Why is it that the typist after a short rest does not return to the correct initial position? Simply because the standard seat requires too much effort to do so. She, therefore, takes unconsciously a poor position rather than to correct it by a muscular effort. Figure 9 shows in the upper part the important efforts that are produced by moving from the working to the resting position and vice versa.

A special chair with a sliding seat was built. When the subject wants to relax, the seat follows the forward motion of the pelvis and the back automatically adjusts itself to the reclining position of the trunk towards the rear. When the typist returns to a working position, the seat and the back of the chair follow the motion of the body. The lower part of Figure 9 shows that the muscular efforts have been reduced considerably, from 12 to 1. Such a chair gives the typist the possibility to be at all times and naturally in a correct position with her back solidly supported.

Another study was made of the efforts developed by a typist working at an ordinary desk when she picks up a sheet of paper with her right hand, transfers it to the left hand and then picks up a carbon on the front part of the desk. Five different possibilities of improving the performance were successively studied and in the solution finally adopted, the efforts were reduced from 4 to 1 with a concomitant gain in speed.

Other experiments showed that two different kinds of typewriter keyboards required very different efforts from the same qualified typist, reaching as much as 15 per cent.

Conclusions

Each job must be analyzed and improved according to the principles of effort economy and fatigue prevention. Our method brings a new technique of investigation by which progress has already been achieved in the analysis of the voluntary movement and which looks promising in physiological research on motion economy and fatigue. In the field of industrial application the practical value of the study of human work has been demonstrated and our measurements, answering the fundamental problem, should lead to improvements. ■

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management people in industry and business.

CY FREEMAN studied Mechanical Engineering at the University of California, completed the course in New York at Cooper Union Institute of Science and Art, receiving a Bachelor of Mechanical Engineering degree. Before joining the Worthington Corporation staff, Mr. Freeman was associated with Radio Receptor Company of New York as an applications engineer; and with Hearst Magazines, Inc., where he worked with Good Housekeeping Institute. He authored "How-To-Do-It" articles and originated the well-known "Safety Is No Accident" theme used in *Good Housekeeping* Magazine. Mr. Freeman also edits Worthington Corporation's publications *Power and Fluids* and *Marketing News Letter*.

Industrial Publications — Versatile Management Training Ground

by Cy Freeman

Accounts Manager, Engineered Products
Advertising & Sales Promotion
Worthington Corporation

INDUSTRIAL publications personnel benefit from many facets of varied and valuable management experience. Sales, labor relations, interpretation of policy, product development, top management contact, reporting, budgeting, and group leadership are just a few areas in which men and women entering this field can mature.

Since publications personnel should play a part in future management selection, special attention should be paid to the choice of beginners. Know their specialty and the important part it plays in the modern business picture. This article covers the basic information you need and suggests ways to use it.

All industry today is highly competitive. Corporations and businesses employ the most modern tactics and resources for servicing their personnel, customers, and sales markets. Most large progressive companies have also come to realize that they must as surely compete with basic internal and external communication tools such as mail and correspondence, advertising, sales promotion, and publications—as with their products.

Without a doubt, the importance, capacity, or limitations of "Communications" has often been a key factor making for large scale industrial reorganization. These communications might be internal (person to person, department to department, or employee-management) or of the company-buyer or distributor type. They might involve decision or policy making channels—or Sales, Manufacturing, Management working communications. Regardless of the particular influence or technique or channel for communications, it is the organization's performance, efficiency, or advancement that is at stake.

Paraphrasing a recent popular song, "Communications Is A Many Splendored Thing." Reorganization, different sales techniques, chains-of-command, sales promotion—all these and more can be part of "communications." However, one of the universally accepted projects, in management's view, is what is usually called "the house organ."

I don't particularly like this term, "house organ," because it implies to me a less than professional effort—a "you'll understand if it's not just right," lower-cost project.

But this isn't the case. Company publications take the form of all recognized business trade and consumer press including magazines, newspapers, news letters, brochures, pamphlets, etc. Every large industrial organization supports at least one publication, and most have more than one.

Your company may produce a combination of publications designed to reach different audiences. Perhaps an internal, to cover management-employee relationships; internal-externals to cover Sales-Distributor relationships, and a clear-cut external to promote sales of the company's products by building prestige, education, or acquainting prospects with management and their opinions.

There are over eight thousand company publications produced in this country today, and some of them come very close to competing with business and trade publications across-the-board in terms of circulation, content, production quality, and readership following. For the beginner out to get experience, to break into the editorial or any other phase of the publication fields, the business, trade, or news press cannot begin to match opportunities offered by company publications.

By the same token, you can't afford to ignore work with this experience potential as a management training ground.

I would like to discuss a few of the various types of publications that really make their mark in industry today. First, there is the *internal* type, designed to either:

Promote better Labor-Management relations

Stimulate manufacturing output

Promote sale of goods through the Sales force—such as a *News Letter* for refreshing sales peo-

ple on Merchandising fundamentals:

Provide news about products, telling about promotional support, explaining company policy, describing competition's activities

Give news of product developments and applications

Promote friendly relations among employees and boost moral.

These internals can be News Letters, newspapers, or magazines. They represent a vital communications channel for management thinking, whether or not the publication is designed to achieve *obvious* management objectives. Persons responsible for any such publications are continuously in the spotlight. If a starter is worth his salt, he has a definite advantage as part of the communications team with an industrial organization. There he can be observed on a job-done basis.

External publications are in many ways typified by Worthington's magazine *Power and Fluids*. The purpose of this book, in the final analysis, is to promote sale of our industrial products.

Power and Fluids' technique involves dissemination of useful technical information concerned with the application and maintenance of Worthington type products. This is meant to inspire confidence on the part of our prospects. It means producing not only a professional magazine on a regular schedule, but one which continuously contains editorial material of a very high calibre. The staff of this magazine does not have the time to personally develop all this editorial material, edit it, lay out the magazine and produce it. As an alternative, we all familiarize ourselves thoroughly with our company's markets, products, and selling procedures and then—with ability to apply this knowledge in personal relations with customers, our Sales force, and with top management — we must recruit editorial material in a near finished form from technical people, salesmen, management, and research personnel. Indeed, we must be *salesmen* of fairly high calibre ourselves, since we must persuade someone to divert valuable time in the *other* person's eyes, to projects which are not in their direct line of duty.

This makes a very important point then. Industrial publications experience makes for a type of selling experience, and proved selling ability is a prerequisite for many present day industrial management positions.

Without going into great detail on other types of industrial publications, which are mostly variations of internals or externals, let's look at the requirements for a beginner on a typical industrial publication's staff.

I'm going to be *very* frank (I hope this doesn't make me unpopular in the Editors' Societies). Other than a "talking knowledge" and application ability with the basics of publishing and editorial work, (which students can and should get in undergraduate publication jobs), the only other *basic* requirements for a beginner are personality, general intelligence, and if I may inject an intangible, "sales sense." Sales sense is, for our purposes, the ability to get along with other people, to understand their needs and inclinations, and to make a realistic evaluation of the effect of action and reaction in a working relationship. This is something that can actually be estimated by your trained personnel interviewer. You might well state it as a qualification for getting a job.

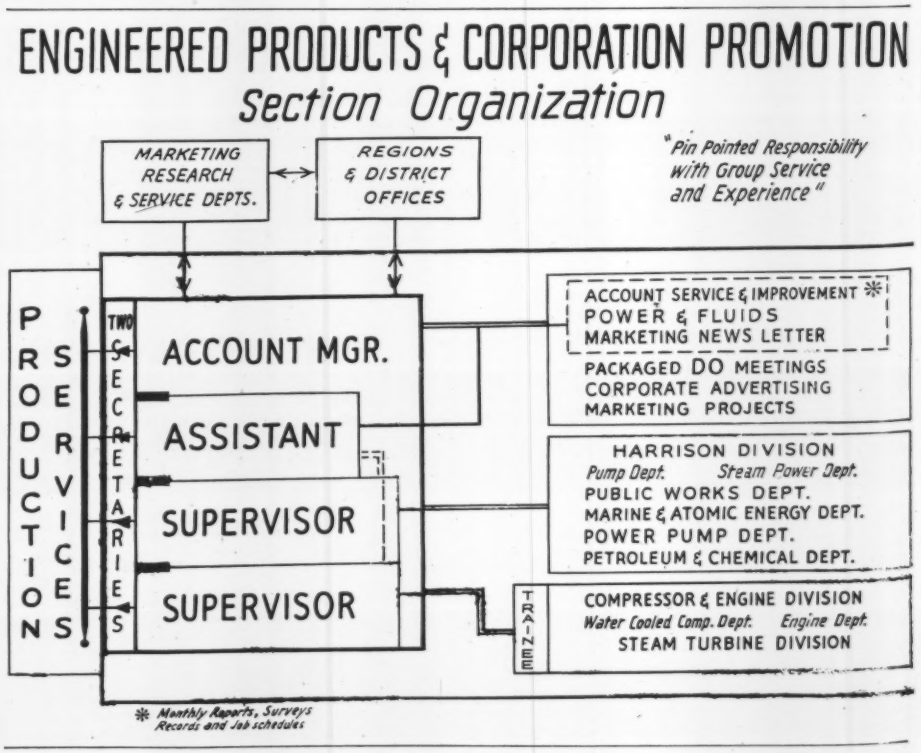
Technical background and specialization should not be basic requirements for *most* industrial publications jobs. That end of the work is left to specialists in the organization who devote their time to this "special" effort whenever necessary. Also, you can't help but pick up general technical information and, eventually, understanding, as you work in any one field. You may expect this of talented publications personnel.

One measure of the beginner's eventual success is his capacity for job penetration, or, in simpler words, basic ability to learn. Here's that important point again. Whenever technical or specialist aid is needed, it is provided by competent personnel on a special project basis.

In my opinion, the best background the neophyte can develop for industrial publications work is made of a broad or liberal education. A good journalism background will help, although even that certainly isn't essential. My recommendation is to choose personnel who have learned a little about a lot, even though the natural inclination, the popular one these days, is to choose the specialist. The person who has developed reading and study habits should have education and interests which are not rigidly limited by any one field or skill. His speciality (major interest), if any, can then be made the key to progress and opportunity, rather than a sign of personal limitations.

Now, a subject that's dear to my heart. This has to do with the light in which one considers an opportunity in industrial, or any other type of publications work. I've met any number of young people who consider publications staff work as a definite desired end. They look on the editor's position of *any* publication as being a summit, a goal in itself.

I prefer to think of publications or any other communication work as a means—a step towards even more important, responsible, satisfying, and lucrative positions in industrial man-



agement. It must be obvious that if communications is a primary tool of modern day management, those people who develop the communications medium and make it work most effectively, must be the logical prospects for some phase of future management. This is a real and convincing personnel argument. I've used it and I believe in it.

Worthington is a fair example of general present-day industry in that it produces a highly diversified range of industrial and commercial products, as well as a consumer air conditioning line. Persons starting in positions with our publications staffs are actually part of the Worthington Advertising and Sales Promotion Department and therefore are in direct line for promotion through the ranks to Advertising and Sales Promotion Account Manager positions. The opportunities for advancement are made clear to prospective personnel.

The title, *Manager*, suggests the magnitude of a goal which might be pointed up as a beginner's eventual objective, and the industrial publications field should assume its proper perspective as one step to be successfully taken in achieving that goal. It is the step that can give broad and valuable experience in a relatively short period of time—that can offer the benefits of most complete experience without involving numerous functional job responsibility changes.

Industrial communications media provide means through which the world's most powerful private organizations transmit their thoughts, news of actions, and decisions. It should be a field of unlimited opportunity, and for those who will apply themselves, a definite step towards industrial management positions. Companies that acknowledge this management training advantage will find it a valuable addition to personnel development programs. ■

University Membership Growth Awards

The schools listed below received membership growth awards in recognition of either 50% or 100% increase in membership during the first semester or quarter:

American University
Antioch College
Babson Institute
Clarkson College of Technology
Miami University
Rider College
Rutgers University
Southern Methodist University
University of Alabama
University of Connecticut
University of Missouri
University of Pennsylvania
University of Southern California
Villanova University
West Virginia University
Woodbury College

UNIVERSITY CHAPTER STANDINGS AS OF FEBRUARY 1, 1957

Indiana University	270	Rutgers Univ. at New Brunswick	45
University of Texas	200	St. John's University	45
University of Connecticut	187	Bowling Green State University	44
University of Houston	174	University of Baltimore	44
University of Illinois	169	University of Detroit	44
LaSalle College	155	University of Dayton	43
Boston College	111	Lawrence Institute of Technology	41
University of Pennsylvania	106	University of Tennessee	40
Mississippi State College	103	Antioch College	37
Ohio State University	103	Rensselaer Polytechnic Inst.	36
Ohio University	100	San Diego State College	36
St. Peter's School of Business	98	Seton Hall University	36
Villanova University	98	Univ. of California at Berkeley	36
Georgia Institute of Technology	97	Cornell University	35
Alabama Polytechnic Institute	93	North Texas State College	35
Tennessee Polytechnic Institute	93	Kansas State College	34
Boston University	87	Louisiana Polytechnic Inst.	34
Franklin & Marshall College	87	Loyola University at New Orleans	34
University of Alabama	87	Sacramento State College	33
Northeastern University	78	University of Florida	32
Yale University	77	University of Richmond	32
Pennsylvania State College	74	Western Michigan College	32
University of Pittsburgh	72	Los Angeles State College	31
University of Wisconsin	72	College of William & Mary	30
Rider College	68	University of Scranton	28
University of Oklahoma	65	Duquesne University	27
Babson Institute	64	New York University	27
Hofstra College	63	St. Louis University	27
Southern Methodist University	60	Emory University	26
West Virginia University	59	University of Michigan	26
Woodbury College	59	City College of New York	25
University of California at L. A.	58	Drexel Institute of Technology	25
Clarkson College of Technology	57	University of Rhode Island	24
Guilford College	54	Villa Madonna College	24
Syracuse University	52	DePaul University	22
University of Missouri	51	George Washington University	22
American University	50	Fenn College	22
Newark College of Engineering	50	Roosevelt University	20
Miami University, Oxford, Ohio	49	Georgia State College	19
University of Minnesota	49	St. Joseph's College	19
Loyola University at Chicago	48	University of Chattanooga	18
Temple University	48	University of Bridgeport	16
Butler University	47	Oregon State College	15
Louisiana State University	47	Pennsylvania Military College	15
University of Southern California	46	Southern Technical Institute	5

February 16, 1957

Notice to All Members

Proposed Change in Dues Structure

By-Laws, Section 111—Annual Dues

At the October 27, 1956 Meeting of the National Board of Directors, the National Treasurer, on behalf of the Finance Committee, presented various alternative methods of increasing income to the National Office in order to maintain the Society's program budgeted and adopted by the National Board of Directors. Based upon responses from the Chapters and further considerations, the Executive Committee, on February 16, 1957, recommended the following method as the most appropriate in line with current conditions:

A. Present National dues of $20.00—Full Member; $10.00—Associate Member; $7.50—Junior Member; $40.00—Firm Member (2 representatives); be retained for the National Program, instead of present rebate of 25% of these dues to Chapters.

B. Entrance Fee of $5.00 to remain the same, and to be rebated to the Chapter as at present.

C. Optional Chapter Dues: (1) to be established by each Chapter, if wanted (2) in increments of $2.50 (for expediting) (3) to be collected by the National Office and rebated to the Chapter.

D. Student Dues to remain the same.

The Proposal will be voted upon at the next Meeting of the National Board of Directors on April 27, 1957.

This proposed procedure is now successfully followed by a number of other professional Chapter associations. It permits each Chapter to determine the amount of its own local dues in relation to its needs, desires and local circumstances.

Most of the associations and organizations comparable to S.A.M. have increased their National Office dues during the last 12 years, in amounts ranging up to 67%. Their current dues are now, in the large majority, considerably higher than S.A.M.

A series of eleven factual exhibits supporting this proposal has been sent each Chapter Officer and National Director. Each S.A.M. Member will soon receive a new brochure listing Benefits and Services from membership. ■

APRIL CHAPTER ACTIVITIES

CHAPTER	SUBJECT	SPEAKER	TITLE	PLACE	DATE
Alabama	Time Study and Incentives	Ralph W. Gordon	B. F. Goodrich Company	Tutwiller Hotel	9
Baltimore	Annual Spring Conference—Profit Possibilities for Small Business through Automation	Conference Moderator, Edward L. Rich, Jr.		Sheratin Belvedere	8, 9, 10
Binghamton	Selling Work Simplification	Allan H. Mogensen	President, Work Simplification Conference	Carlton Hotel, Burgundy Room	10
Boston	Spring Conference			University Club	11
Bridgeport	Systems and Procedures	Marc Baker	Supervisor of Forms and Procedures, State of Connecticut	Algonquin Club	2
Central Pa.	Optimum Maintenance Policy via Mathematical Models	K. J. Cohen	Carnegie Institute of Technology	Student Union Building, State College	18
Charlotte	Executive Development	Jason Cooper	Coordinator of Management Development, Esso Standard Oil Co.	Mecklenburg Hotel	8
Chicago	Current Legislation: Workmen's Compensation-Social Security-Unemployment Compensation	K. Giles	Link Belt Company	Toffenetti's Restaurant	15
	Administration & Control of an Industrial Engineering Department	R. N. Wleand	Manager Incentives, Visking Corp.	Furniture Club of America	9
	Organization and Administration of An Operations Research Activity	H. Przestwor	Motorola, Inc.	Hardings Presidential Grill	2
	Inventory Standards — The Measurement of Inventory for Effective Inventory Control	A. Weiss	Altschuler, Melvoin and Glasser	Furniture Club of America	25
Clearing	To be announced	F. F. Bradshaw	President, Richardson, Bellows, Henry & Co.	Clearing Industrial Club	24
Cleveland	Manufacture Controls	C. R. Dowd	Assistant Mgr., Ernst & Ernst	Cleveland Engrg. Society	8
Detroit	Operations Research	Dr. Roger Crane	Touche, Niven, Bailey & Smart	Rackham Memorial Bldg.	23
	New Trends in Industrial Engineering			Rackham Memorial Bldg.	2
Georgia	More Sales at Lower Sales Costs	Al N. Sears	V. P., Remington Rand, Inc.	Elks Club	18
Greensboro	Mass Motivation	Dr. Ernest Dichter	President, Institute for Motivational Research, Inc.	Greensboro Country Club	9
Greenville	Communications	Charles Kluss	Champion Paper Co.	Poinsett Club	10
Hartford	Management — 1957	Robert A. Weaver, Jr.	President, Bettinger Corp.	Bond Hotel	18
Hudson Valley	Management's New Frontier —Material Handling	Glen R. Johnson	Clark Equipment Co.	Hendrick Hudson Hotel	2
	Product Planning for Profit	J. T. Castles—Chairman		De Witt Clinton Hotel	17
Knoxville	Scientific Management	Homer E. Lunken	Lunkenheimer Co.	Deane Hill Country Club	9
Lancaster	The Atoms Future in Industry	J. Carlton Ward, Jr.	President, Vitro Corp.	Hotel Yorktowne	16
	Utilizing the Ideas of Your Employees			Lancaster York	3, 10 4, 11
	Plant Visitation			York Corp.	16
London and District		William Gomberg	Professor of Industrial Engineering, Washington University	Queen's Park Administration Building	18

APRIL CHAPTER ACTIVITIES

CHAPTER	SUBJECT	SPEAKER	TITLE	PLACE	DATE
Long Isand	Cost Control vs. Cost Reduction for Small and Large Companies				22
Los Angeles	Scientific Management in Government	Sam Roberts	Director of Finance, City of Long Branch		18
Madison	The Story of a Strike	C. F. Van Pelt	President, Fred Rueping Leather Co.	Spanish Cafe	10
Milwaukee	Management Philosophies for Small Companies	John A. Patton	John Patton Management Engineers	E.S.M. Building	11
Montreal	Electronic Data Processing	Panel Discussion		Ritz-Carlton Hotel	10
Nashville	Management Looks at Materials Handling	R. W. Puder	E. I. du Pont de Nemours & Co.	Hermitage Hotel	11
	Linear Programming	Harry Schwan	Vice President, Methods Engineering Council	Colonial House	18
Northeast. Pa.	Effective Standard Costing	Thomas J. Davis	Controller, Capitol Records, Inc.	Europa Lounge	1
North Alabama	Duties of a Manager	N. C. Williams	Branch Manager, IBM Corp.	Russell Erskine Hotel	10
	Management Seminar on Executive Development			Redstone Arsenal	18, 19
North N. J.	Art of Communication			Essex House	18
	Industrial Safety-In Plant Accident Control	John Turk	Safety Director, U. S. Metals Refining Co.	Essex House	11
	Plant Visit			Ballantine Co.	2
	Job Evaluation			Bloomfield College	1, 8, 15, 22, 29
	Industrial Engineering for Municipalities			Bloomfield College	1, 8, 15, 22, 29
Pittsburgh	Industrial Engineering Has Something to Sell	Phil Carroll	Management Consultant	Gateway Plaza	18
Portland	Glass Making	Mr. Connoy	Owens-Illinois Glass Co.	Owens-Illinois Glass Co.	24
Providence	Work Simplification	Herbert F. Goodwin	M.I.T.	Brown Faculty Club	4
Raritan Valley	Plant Visit			Anheuser-Busch, Inc.	17
Reading	Executive Development	Robert K. Stolz	Management Consultant, McKinsey & Co.	Iris Club	8
Richmond	Small Business Management	Panel Discussion		John Marshall Hotel	23
Sacramento	Industrial Relations	Paul St. Sure	Managing Director, Oakland Employers Assoc.	Capitol Inn	2
Trenton-Delaware Valley	Fatigue—Measuring & Reducing It	L. A. Brougha	E. I. du Pont de Nemours & Co.	Hotel Hildebrecht	16
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